Abstract

Quality of Life in Medieval Monasteries and Nunneries

Ashley Elizabeth Tallyn

The purpose of this thesis was to explore the possible differences of quality of life in medieval monastic institutions based on the sex of their inhabitants, their location, and/or their ideology. The use of the term quality of life, however, is not commonly used in reference to archaeological or historical populations. This thesis explores the use of the term quality of life in a variety of fields and evaluates its use in relation to the populations being studied as well as the socio-cultural and theological implications of the medieval society that would have shaped these individuals' lives.

Eight monastic sites were chosen based on their adherence to the requirements of the research, in terms of location and ideology, as well as the availability of skeletal remains from the sites. The presence or absence of previously identified health indicators were compared, as were the proportion of different types of artefacts and contemporary financial data, to assess any differences in quality of life. It was found that there were differences between the various types of sites, but that wealth appears to have had a greater influence on quality of life than the sex of the inhabitants, location, or ideology of a particular monastic institution. These factors could play an important and influential role, but that the wealth of the institution most likely played a larger role.

The conclusion of this research is that the term quality of life is appropriate when used in relation to archaeological or historical populations, but that the definition of it must be explicitly stated. It also concludes that individuals entering into medieval monasteries and nunneries could expect to have a higher quality of life than a lay person, but that their own experience would have been heavily influenced by the wealth of the particular house to which they belonged.

Quality of Life in Medieval Monasteries and Nunneries

Ashley Elizabeth Tallyn
PhD Thesis
Archaeology Department
Durham University
2013

Table of Contents

List of Tables

List of Figures

Declaration

I, Ashley Elizabeth Tallyn, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Statement of Copyright

“The copyright of this thesis rests with the author. No quotation from it should be published without the author's prior written consent and information derived from it should be acknowledged.”

Acknowledgements

I first want to thank Charlotte Roberts and Pam Graves, my supervisors, for all their help and support over the last three and half years.

I want to thank also thank all the people who gave me access to the different site archives and helped me to understand what I was looking at: Malin Holst of York Osteoarchaeology Ltd and Steve Timms of Mike Griffiths & Associates for allowing me access to the Sinningthwaite archive; Christina Kyriacou of York Archaeological Trust for access to the archive for Clementhorpe and St Andrew's Priories; Dave Evans of Humber Archaeological Services and Jo Buckberry of the Biological Anthropology Research Centre at University of Bradford for access to the Hull Austin Friars' archive; David Baker for all his help with the Elstow Abbey archive; Helen Rees with the Winchester Museums for access to the Nunnaminster archive; Sue Brown for her help with both the Nunnaminster skeletal population as well as the Hulton Abbey data sheets, and Deb Klemperer with the Potteries Museum for granting access; Kate Iles with the Bristol Archaeological Services for her help with the St James' Priory collection; Paul Pert (Newham Heritage Services), Jenni Munro-Collins (Newham Archives) and Jelena Bekvalac (Museum of London) for helping me with access to the Stratford Langthorne archive.

I would also like to thank Virginia Hatton, Claire Enderby and Laura Sclanders for letting me crash on their sofas while doing data collection. And, of course, my parents and sister for their proof-reading and sympathetic ears. Finally to my partner, Mike, for his support all along the way.

For Mike
I couldn't have done this without you.

Chapter 1: Introduction

The inspiration for this particular research project began with an interest in monastic life kindled by the reading of Dom David Knowles, whose life work into medieval monastic life is still, even after over fifty years, an essential foundation and reference for the field (Knowles, 1948; Knowles, 1955; Knowles, 1959; Knowles, 1976; Knowles, 1976). Harvey's (1995) work using documentary evidence to carry out detailed analysis on monastic diet was equally inspiring, as it tested a well the known stereotype of the fat monk. The work of Rogers and Waldron explored the possibility that this extreme diet may have had a significant impact of the health of these individuals that is still visible archaeologically (Waldron, 1985; Rogers and Waldron, 1995). Waldron's (2009, 1-11) additional warnings of caution when drawing such conclusions were equally influential. Finally, in terms of the diet and living conditions of medieval monks in England, the work of Bond into the landscapes and practicalities of their existence was key (Bond, 2001; Bond, 2004). Although not an exhaustive list, these key authors and texts provide the framework in which this PhD was developed, at least in terms of the lives of monks.

The interest in nuns' lives was kindled, in part, because of the scarcity of references to nuns in these, and other, foundation texts. The first person to publish a seminal reference book on the lives of nuns, in the same way Knowles had done for monks, was Eileen Power (1922). Her book, although not as exhaustive as Knowles' work (largely because of the lack of written records surviving from nunneries), represents a goldmine of information regarding the documentary evidence for the lives of nuns. McNamara, writing 60 years later, similarly provided a body of work that provided historical background to the study of medieval nuns (McNamara, 1987; McNamara, 1996).

The work of both Bynum and Gilchrist build on this historical framework built by Power and McNamara and use it to explore more tangential ideas about the lives of these women (Bynum, 1987; Bynum, 1991; Gilchrist, 1994; Bynum, 1995; Gilchrist, 1997a; Gilchrist, 1997b; Gilchrist, 1997c; Gilchrist, 2012). Their work was a springboard from which the idea for this research grew, allowing for the possibility of looking at the data from a different angle. Similarly, the work of Bell into the literacy and education of nuns illustrates the importance of skepticism when carrying out historical and archaeological research (Bell, 1995; Bell, 2008). The idea that nuns were largely uneducated was fairly pervasive until Bell (1995, 13) stopped believing the medieval stereotypes and carried out his own research. Finally, as with the lives of monks, the work of Bond into the practicalities of the lives of nuns was invaluable (Bond, 2003).

However, as informative and fascinating as all of the studies are, the vast majority of people researching monastic life focus either on monks or nuns. Systematic and cross-disciplined

comparison of these two groups, however, has not been a priority of the research community as a whole. Keeping (2000) carried out a multi-discipline study of the lives of medieval nuns, comparing their skeletal health and a selection of documentary evidence with that of both monks and lay people. While she discusses the health of the monks in her study, her focus in on the nuns and how their health compared to the wider medieval society. It is the goal of this research to begin to understand how the lives of medieval monks and nuns differed and what may have shaped these differences.

The goal is not to understand how the lives of the professional religious practitioners compared to lay people, but rather to understand the differences within the medieval Church. Additionally, as the health of these individuals made up only one aspect of their overall quality of life, it is the hope of this research that a better understanding of the entirety of a group's quality of life can be assessed archaeologically. Therefore, this thesis has three aims

- To consider the validity or suitability of the phrase "quality of life" (QoL) when studying the lives of archaeological populations
- To explore the differences, if any, between the quality of life of the inhabitants of different monastic groups according to gender (nunneries and monasteries).
- To detect any inequality in the QoL between northern and southern houses, urban and rural sites and between orders (older and reform orders).

The first aim, to assess the suitability of using the term quality of life in an archaeological and historical context, is addressed by examining the use of the term in relation to living populations by a variety of international and national organisations. This is in addition to ideas surrounding quality of life in philosophical, theological, and medical writings that would have been available to medieval people. There is also a discussion of the two pronged approach needed when discussing medieval quality of life, as both the physical and spiritual bodies were of great importance to the medieval Church.

The second and third aims, to assess differences in quality of life in medieval monasteries and nunneries, are addressed by exploring the skeletal, artefactual and documentary evidence gathered from eight monastic sites in England. They seek to explore a small selection of factors that may have had an impact on quality of life of the inhabitants of a medieval religious house. The goal is to discuss the question of which type of house would impart the highest quality of life on an individual if they were able to choose from any, or all of these criteria. In other words, if an individual were a true blank slate, without sex, ideology or any hindrance to their location, what type of house would grant them the highest quality of life?

Through understanding the differences in the quality of life of the inhabitants of different monastic institutions, it will be possible to better understand potential motivating factors for entering said institutions, outside of religious zeal. Kerr (2009, 13-4), for example, suggests that a number of people likely joined monasteries and nunneries to ensure that they always had enough to eat and a roof over their heads. This may shed light on aspects of medieval life that have previously been overlooked. In a more general sense, exploring differences in quality of life between different historical groups could provide a more complete understanding of past societies and, in using a phrase that is understood by the public, allow people to relate to the individual people they read about in history books and see in museums.

In addition to the historical educational and academic benefits, understanding the quality of life of past societies could also improve understanding of modern quality of life. By studying the quality of life of people in the past, it is possible to construct a timeline of people's lives in a particular region or country that could provide a more complete understand of why some groups have a lower quality of life than others, as well as potentially provide historical and cultural clues that may lead to ways of improving the quality of life of these groups.

1.1 Definition of Terms

It is important, in any written work, that all terms being used are understood to mean the same thing by the author and the audience. For the sake of clarity, the following section will go through some of the terms and phrases used in this thesis. The terms used to describe the various health conditions studied in this thesis are defined as each appears.

1.1.1 Period of study

The medieval period, or Middle Ages, is roughly considered to be the period between the fall of Rome, approximately AD476, and the start of the Renaissance, which varies by country but is definitely started by AD1600. This period is generally divided into two sub-periods, the early medieval period and the late medieval period. This research focuses on the late medieval period in England, which is generally agreed to start from the kingship of William the Bastard (or Conqueror) in AD1066. The late medieval period comes to its end in England during the reign of Henry VIII (1509-1547), but for the purposes of this research will be considered to end at the Dissolution of the monasteries between AD1535-8. The term *medieval* will therefore be used to mean the late medieval period from AD1066-1538.

1.1.2 Monastic history

This research focuses on the lives of people associated with monastic institutions in medieval England. There are a number of words used to describe the monastic world. The word *house* is used to refer to a single monastery, nunnery, or friary. These institutions could be called *abbeys* or

priories, which were, essentially, different titles for the same type of religious house. As such, no distinction will be made between abbeys and priories in this research.

Houses could be also male or female, monastery or nunnery. For the sake of this research, a *monastery* is defined as a religious house in which the professed community is exclusively male (monks), while a *nunnery* is a religious house in which the professed community is exclusively female (nuns). Houses also belonged to different *orders*, which were different types of monastic institution, each following a different interpretation of the general idea of monastic life, the different incarnations of the various rules set out to govern monastic life, and the ways these rules agreed with the central tenets of Christianity in the medieval Church. These various orders will be divided into two subgroups for the purposes of this research; *older* and *reform* orders.

The older orders include the Benedictine and Augustinian orders, which were founded in the early medieval period (Knowles, 1948, 5). Both orders grew out of the ideas of single individuals, Benedict of Nursia and Augustine of Hippo, who had both been inspired by the hermits and communities of hermits in the East to lead lives dedicated to serving God through prayer and work. In both cases, these men inspired others who wanted to join them in communities dedicated to these ideals. The two men wrote rules for their communities, which were used to found countless monasteries dedicated to living according to them. These rules were called the Benedictine Rule and the Augustinian Rule. The Benedictine and Augustinian orders flourished throughout the early and late medieval period.

However, during the 11th and 12th centuries, at the beginning of the period in focus in this research, there were many who felt that the monks and nuns living within these orders had lost sight of the original tenants of poverty, chastity, and charity. Many people, monks and nuns included, believed that these orders needed reforming and so a few individuals decided to found their own orders with the intention of rigidly adhering to the monastic Rules. The *reform* orders are defined as those orders who were formed after the twelfth century as an attempt to get back to, what they saw, as the original values of monastic living (Lawrence, 1989, 176). Reform orders, including the Cistercians, Carthusians and Premonstratentions, were founded with the view of going back to the stringent rules of poverty, dietary restrictions, and isolation (Lawrence, 1989, 176). The reforming ideals of many of these orders, however, were called into question by monastic critics and were often accused of the same behaviour they had sought to reform (Knowles, 1948; Knowles, 1955).

Another kind of religious house popular in the medieval period were *friaries*. *Friars* were members of male religious houses that were devoted to extreme poverty or *mendicancy*, where all support had to come from begging or charitable donations rather than farming or other work, and preaching the Christian faith to the masses (Knowles, 1948, 120). These orders, including the Franciscans,

Dominicans, Carmelites, and Augustinian friars, were known as *mendicant* orders and became popular in the 12th and 13th centuries (Knowles, 1948).

Most of the mendicant orders did not originally allow women's houses to be associated with them, although many women wanted to be included in them. By the end of the medieval period, however, most mendicant orders had allowed some, scattered female houses to be founded, although they were banned from preaching in public for fear that this would undermine their reputation of chastity (Shahar, 2003, 30; Bynum, 1987,, 19). Mendicant orders are included in the overarching category of *reform* orders used in this research as they often criticised the *older* orders for what the friars perceived as their worldliness.

1.1.3 Location

Two other criteria were used to identify sites to be used for this study and they are related to the location of the house, either north or south and urban or rural. For the purposes of this research, *North* was defined as anything north of the Humber River on the eastern coast and north of the southern border of the county of Cheshire on the west coast. *South* is defined as being south of these landmarks. These were included to explore the extent to which environmental and regional, i.e. climate, soil conditions, etc., factors could have influenced the quality of life of the inhabitants of the religious houses.

The urban and rural distinction relates to the setting of the house in these two locations both at the time of foundation and dissolution. *Urban* was defined as those houses situated both within medieval town or city walls and those just outside the walls. *Rural* houses were defined as those that were located in an isolated location. Although it was not unusual for a village or hamlet to be formed near to one of these rural houses, these houses did not have access to the supporting population, city storage facilities, and the protection associated with an urban location. Many of the ruins of these houses are now located within an urban environment, but were more than a day or two's journey from a city in the medieval period.

It is important to note that the location of a house could be heavily influenced by ideological beliefs, with several of the reform orders, specifically the Cistercians, choosing locations in remote or rural locations (Knowles, 1976, 215; Knowles, 1948, 64-77). Others, specifically the mendicant orders, preferred urban locations (Knowles, 1948, 114-126). Any conclusions based on location or ideology, therefore, will have to be made with the understanding that one may mask the impact of the other factor on individual or group quality of life.

1.1.4 Life

The idea of an individual's or group's 'life' refers to those components that make up or influence a

person's or a group's daily experience (McGillivray and Noobakhsh, 2004; Fayers and Machin, 2000, 3; Bowling, 1997, 6). This means a combination of their housing conditions, diet and daily activities (meaning both work and leisure activities). The term can be used to describe the physical aspects of quality of life, and differences between groups are described in terms of 'standard of life.' A standard of life is the physical aspects of a person's or group's life, but unlike the term 'life' just described, may also include some social aspects including access to health care and wealth (Szalai, 1980). Quality of life is different from standard of life as it encompasses these physical and social aspects as well as access to and acceptance in further, socio-cultural and political activities (Gregory et al., 2009 8 May 2013; McGillivray and Noobakhsh, 2004; Fayers and Machin, 2000, 3; Bowling, 1997, 6; Szalai, 1980).

1.2 Quality of life

The phrase quality of life, as will be discussed in the following chapter, appears to have been avoided in historical and archaeological research. Seven peer-reviewed journals that are devoted to archaeology, medieval studies, and/or bioarchaeology were selected. These journals have an international reading and contributing base and are produced by respected organisations within their specific field. The journals are *Speculum*[1], *Journal of Medieval History*[2], *International Journal of Osteoarchaeology*[3], *American Journal of Physical Anthropology*[4], *Medieval Archaeology*[5], *Journal of Archaeological Science*[6], and *Journal of the British Archaeological Association*[7]. In these journals, only seven articles were found with the term 'quality of life' in their abstract between the years, 1990 and 2012. One of these articles came from the *International Journal of Osteoarchaeology* (Faccia and Williams, 2008), while the other six came from the *American Journal of Physical Anthropology* (Hoover, 2010; Holt and Formicola, 2008; Merrett and Pfeiffer, 2000; Rothschild and Woods, 1992; Dettwyler, 1991; Cameron, 1991).

---

[1] The journal of the Medieval Academy of America, the largest professional organisation in the United States devoted to medieval studies (http://www.medievalacademy.org 8 May 2013).'

[2] The goal of this journal is to provide an international forum for the publication of scholarly articles on 'all aspects of Europe in the Middle Ages' (http://www.tandfonline.com/ 8 May 2013).

[3] According to the Online Wiley Library, 'the aim of the *International Journal of Osteoarchaeology* is to provide a forum for the publication of papers dealing with all aspects of the study of human and animal bones from archaeological contexts' (http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1099-1212 8 May 2013).

[4] The official journal of the American Association of Physical Anthropologists, the world's leading professional organisation of physical anthropologists (http://www.physanth.org 8 May 2013).

[5] The journal of the Society of Medieval Archaeologists, which is primarily focused on the archaeology of England and Ireland between the 5th and the 16th centuries AD, but also publishes research on the same period in Europe (http://www.medievalarchaeology.co.uk/ 8 May 2013).

[6] 'The journal provides an international forum for archaeologists and scientists from widely different scientific backgrounds who share a common interest in developing and applying scientific methods to inform major debates through improving the quality and reliability of scientific information derived from **archaeological research**.' (http://www.journals.elsevier.com/journal-of-archaeological-science/ 8 May 2013) (emphasis original)

[7] The journal of the British Archaeological Association that 'encourages original research and publishes new work on art and antiquities of Roman to post-medieval date, although the art, architecture and archaeology of the Middle Ages form the core of its interests.' (http://maneypublishing.com/index.php/journals/jba/ 8 May 2013)

The term is used 20 times in these seven articles and the vast majority of these references are usually to clinical research. It is used three times to suggest that the research might impact on current medical practice. Dettwyler (1991, 375 and 383), in her article about exploring the identification and interpretation of disability in the past, uses the term only in a negative sense, suggesting that it was not possible to make conclusions about the quality of life of the people within bioarchaeology, because studies of living people have not yet bridged the 'complex questions of medical ethics and quality of life have not been answered in US society' regarding disability. Holt and Formicola (2008, 87) use the term in reference to an archaeological population, using decreasing stature and 'paleopathological data' to describe a decrease in quality of life in Paleolithic populations from Europe, Asia and Africa.

In short, the term quality of life is not regularly used to describe the results of historical and archaeological research. The reason behind this may be found in Steckel et al.'s (2002, 62) seminal work *The Backbone of History* in which skeletal populations from numerous sites in the Americas are assessed using the same skeletal criteria in an effort to comment on changing health status or 'biological quality of life' over time. Steckel et al. (2002) ensure that they preface the term 'quality of life' with 'biological,' communicating that only this aspect of the quality of life of past individuals can be commented on in their research. The also make clear that it is only through looking at multiple indicators of health that the term 'quality of life' can be used (Steckel et al., 2002, 62).

It could be argued, by contrast, that quality of life, beyond the solely biological, is culturally and historically contingent, and that many cultures and periods of history will not have articulated the concept of 'quality of life' as a measurable entity equivalent to the modern notion. Hence the research, below, that has gone into articulating factors which would affect a medieval notion of 'quality of life'. The importance of Steckel et al.'s assertion that multiple indicators are needed to gain as full a picture as possible if the phrase quality of life is going to be used cannot be overstated. If, however, these multiple indicators include information about aspects of individual or group quality of life beyond physical health, then there is no reason that a more expansive use of the term 'quality of life' cannot be used, provided it remains grounded in a historical and cultural framework that would have been recognisable to the individuals being studied.

It will also be shown that, outside of historical and archaeological research, the phrase 'quality of life' is used in a variety of fields, including international humanitarian organisation (e.g. United Nations and World Health Organisation), nationally run health and well-being services (UK National Health Service), local governments (county councils), and within medical research. Each field uses the data available to describe one or more aspects of an individual or group's quality of

life that is within their organisation's primary focus. It is understood that no one study or discipline can comment on quality of life in its entirety, but rather can describe aspects of quality of life on which their discipline is focused on improving or, at the very least, quantifying in order to facilitate the provisioning of funds and aid by other governmental and humanitarian groups.

The term 'quality of life' is inherently holistic and encompasses more than simply physical well-being; it includes mental health and a personal feeling of contentment (Gregory et al., 2009 8 May 2013; McGillivray and Noobakhsh, 2004; Fayers and Machin, 2000, 3; Bowling, 1997, 6; Szalai, 1980). Medieval Europe was strongly influenced by the Church and its views on the importance of the spiritual body over the physical body (see Section 2.3.3). For this reason, the differences in quality of life for the monasteries and nunneries in this research will be discussed in terms of both physical and spiritual. Quality of life as an idea is culturally and socially defined and, while this research is attempting to gain a modern understanding of medieval quality of life, it must be done with an eye to what would have been important to medieval people. The current understanding of the factors that may have influenced medieval ideas about their own physical and spiritual quality of life will be discussed in detail in Chapter 2.

No studies to date have been carried out combining three different types of data over so many medieval monastic sites. To this end, Chapter 2 will explore what is meant by the phrase quality of life and what considerations must be taken into account when using it to describe past peoples. Following this, Chapter 3 is devoted to outlining the sites used in this research and the methods employed to explore the question of quality of life. Chapter 4 outlines the results of the analyses, followed by Chapter 5 discussing the implications of the data. Chapter 6 briefly summarises the results, outlines limitations of the study, and suggests future research.

Chapter 2: What is Quality of Life?

In order to assess QoL in late medieval monasteries and nunneries, the phrase needs to be defined. Part of the problem with using the phrase 'quality of life' is that there is no set definition used, even in the modern world, as can be seen in the following discussion. Different types of organisations use the term to identify areas of people's lives that could or should be changed to improve QoL. Modern definitions and interpretations will be discussed first, in order to place the later discussion in context. This is not to suggest that modern standards will be directly applied to medieval populations, but they will be used rather to explore the variety of methods used to assess quality of life in the modern world. Modern ideas about quality of life cannot be transposed onto the medieval world, but some of the methods used to measure and examine quality of life at various levels in our society have influenced what has been considered for late medieval England.

The following discussion of definitions will be an examination of the study of quality of life within archaeology and bioarchaeology, and specifically the importance of population based studies in bioarchaeology to access trends in demography and health visible in skeletal remains. The 'osteological paradox' and its relationship to both population health and quality of life studies will also be explored. One of the most important lessons in the discussion surrounding the osteological paradox is that the researcher must understand and take into consideration the culture to which the individuals being studied belong. Without this context, it is impossible to make any interpretations and conclusions following analysis of bioarchaeological data for health and disease.

With the above in mind, the third section of this chapter will explore the ideas surrounding quality of life in medieval Europe. Medieval ideas about quality of life were very much caught up in the debate about the place of the soul in relation to the body, and theological and philosophical debates about which was more important raged throughout the period. The effects of this debate on the medieval idea of quality of life will be briefly discussed. The fourth section of this chapter relates to monasteries and nunneries directly. A review is made of what is already known or believed about quality of life, and thus health, for monks and nuns in medieval England from historical and archaeological research.

2.1 Origin and Interpretation of Quality of Life Today

The exact date for the birth of the phrase 'quality of life' is unknown. The earliest medical test for what we would now call a quality of life assessment comes in 1947 with the Karnosky Performance Scale questionnaire (Fayers and Machin, 2000, p. 6). The phrase appears to have reached the governmental sector sometime in the 1950s or 60s, with the first recorded use of the phrase outside the medical profession is in 1974 when the French Ministry of Environment was renamed 'Ministère de la Qualité de Vie' (Szalai, 1980, p. 8). The idea of it, however, can be found as far back as Aristotle, who saw that the major difference between good and bad political situations was how it affected people's ability to lead flourishing or good lives that made them

happy (Aristotle, 2000). Measurements recorded today for quality of life are often found being used in hospitals to assess treatment outcomes, in local councils to gauge community support for a project, and on an international scale to assess the disparity in living conditions and opportunities between developing and developed countries.

The data being gathered in these studies were not available for the medieval world; for example, questionnaires conducted on the living and gross national product surveys. However, the questions being asked of these data by medical professionals, local councils and global health organisations are similar, as is the central idea that a good quality of life is not simply the absence of disease, but rather a measurement of overall happiness and fulfilment (Fayers and Machin, 2000, p. 3; HDR, 1990, p. 14). Poor living conditions or living with a chronic disease does not mean that one is not happy, but rather than all aspects of a person's life, living conditions, health status, happiness, social integration, etc., must be taken into consideration when assessing their quality of life.

2.1.1 Global standards for QoL

On an international scale, there are two primary organisations that conduct surveys of quality of life, and these are the World Health Organisation (WHO - www.who.int) and the United Nations Development Programme (UNDP) (www.undp.org). Both organisations seek to measure disparities in quality of life between countries and regions within, in order to measure progress and identify areas and populations that require more assistance. As one might imagine, however, their focus is slightly different. The WHO is seeking to understand health related quality of life, i.e. the impact of disease and malnutrition on a population, with the understanding that health is affected by a variety of factors (WHO, 2010), and the UNDP are hoping to understand the health, economic and social quality of life according to specific variables (HDR, 1990).

The WHO measurements focus on three areas to gauge overall population health: overall life expectancy at birth, infant and under-five mortality (probability of dying between the ages of 1 and 5 years), and adult mortality (probability of dying between 15 and 60 years) (WHO, 2010, p. 45). They openly acknowledge that mortality rates tells us 'nothing about health status during life,' so they developed another measurement, that of a person's healthy life expectancy (HALE) at birth (*ibid.)*. HALE is measured as the average number of years that a person could expect to live 'in good health' by taking into account years lived in less than full health due to disease and/or injury (*ibid.)*. For example, if a person lived until they were 60, but spent 40 years of that life suffering from some kind of disease or injury, their HALE would only be 20. Therefore a person who died at 30 could have a higher HALE if they suffered no disease or injury up until their death. They also measure for the number of years of life lost (YLL), which is a measurement of premature mortality, by comparing the frequency of, and age at, death with average life expectancy (WHO, 2010, p. 59).

The WHO also measures the proportion and distribution of specific causes of death within a population, which fall under three subcategories; communicable, maternal and perinatal conditions and nutritional deficiencies; non-communicable conditions; and injuries (WHO, 2010, p. 59). The distribution causes of death among children under 5 are also recorded, as well as the number of individuals affected by selected infectious diseases determined by data availability (WHO, 2010, p. 59, 73). They go on to measure a variety of other variables, including health service coverage, risk, environmental issues, governmental expenditure on health services, health inequalities between regions and general demographic and socioeconomic statistics (for more information, see WHO, 2010).

Many of these same health challenges are measured by the UN Development Program in their yearly Human Development Report (HDR), first published in 1990. Their primary three elements, however, differ from the WHO, as their aim is to measure human development, rather than population health. These three 'essential elements' are: longevity (life expectancy at birth), knowledge (literacy rates), and decent living standard (income) (HDR, 1990, p. 12). When conceived, the Human Development Index (HDI) based these three elements on the idea that everyone deserves to lead a long and healthy life, to acquire knowledge and to have access to resources needed to maintain a decent quality of life (HDR, 1990, p. 10).

Roughly every year, the UNDP produces their report with a different focus. For example, 2009 focused on the issue of mobility and immigration and the effect that has on quality of life (see HDR, 2009). Over the years, the HDI has changed slightly. It still measures life expectancy at birth, but now uses adult literacy and gross enrolment in education to measure knowledge and gross domestic product per capita to measure living standards (HDR, 2007/8, p. 225). These measurements are combined to form a single number that the UNDP uses to rank countries by their development score. When data for these measurement are unavailable, the UNDP uses a combination of total fertility rate, under 5 mortality rate, HIV/AIDS (Human Immunodeficiency Virus infection / Acquired Immunodeficiency Syndrome) prevalence, percentage of population undernourished, and the percentage of a population using improved water sources, in order to gauge quality of life, but it cannot compare these countries to those assessed by the HDI (HDR, 2007/8, p. 223). The UNDP also goes on to measure a variety of variables, including, but not limited to, poverty rates, general demographic trends, governmental spending on health services, water and sanitation status, inequalities in maternal and child health and the leading global health risks (HDR, 2007/8, p. 238-257; for further information see HDR, 2007/8). All the Human Development Reports, dating from 1990 to the present, can be found on the UNDP website and are downloadable at no charge (www.undp.org).

The primary critique of these kinds of measuring systems, known as "composite indices", is that they have 'the tendency to oversimplify a complex system and give potentially misleading signals'

(Natoli and Zuhair, 2010, p. 6). There are three commonly identified problems in the use of composite indices; the decision of weighting the various components, the inherent bias in the selection of these components, and the difficulty in the comparison of components that are measured in different ways, i.e. the comparison of percentages and range values (*ibid*; McGilvray and Noorbahsh, 2004, p. 3-5).

An example of the problem of weighting different component statistics of a composite index is the use of both population literacy levels and that of maternal life expectancy. If a composite index does not give weight to one measurement and not another, it could be argued that the organisation carrying out the research places equal value on their affect on people's quality of life within a given group (McGilvray and Noorbahsh, 2004). The second criticism, that there is an inherent bias in the selection of the components that go into a composite index, is fairly straightforward (McGilvray and Noorbahsh, 2004). The issues that are believed to accurately reflect safe national development in the western world may not be the same as those who are living in other countries, average age of marriage, for example. In many countries, people marrying in their teens or younger is a socially acceptable practice, whereas teenage marriages are frowned upon in those countries active in carrying out the research. By making this statistic part of a composite index measurement of quality of life, there is an implication that one set of values is better than the other (McGilvray and Noorbahsh, 2004). The final commonly identified problem with composite indices is the difficulty in comparing different types of measurements (McGilvray and Noorbahsh, 2004). If one measurement is a percentage, for example the percent of individuals in employment, and another is a range value, for example the number of years people spend in education, these two measurements cannot be directly compared and their inclusion into a composite index results in their being converted into measurements that will more easily blend. This has been argued to devalue their reflection of the population being examined.

Other critics of the HDI suggest that it is an incomplete measure and that it leaves out important issues relevant to health, human rights and quality of life. Over time, many of these critiques have been examined by the UNDP and some have led to the incorporation of additional measurements into their reports, and a consideration of environmental issues and deprivation measurements, for example (Raworth and Stewart, 2004, p. 167; HDR, 2007/8). Another problem with both the HDI, WHO and any large scale measurements is that, as the data can come from a variety of sources, trustworthy and otherwise, the comparison will always be flawed (Raworth and Stewart, 2004, p. 172). That said, in order to improve measurements of quality of life, there has to be a starting point and a base on which to build. Over time, the methods used by the HDI and WHO, as well as all the other quality of life measurements discussed above, have changed and adapted to new ideas. In effect, they have become more accurate and representative of the individuals and countries being measured.

There are also critics who suggest that both the WHO and the UN's quality of life measurements misrepresent certain groups within a population. Eckermann (2000, p. 29) argues that women's quality of life is overlooked because of the lack of gendered measurements. She points out that mortality measurements skew quality of life measures as women, regardless of social wellbeing, outlive men, while '[g]ender differences in morbidity have…often been put down to women's propensity to seek health care,' rather than an actual need for more health care (Eckermann, 2000, p. 34-5). Her argument continues with a criticism of the use of social indicators in quality of life measurements, i.e. access to health care or education. Social indicators, in her view, only give an idea about '*possible* quality of life experiences…not…whether such quality is actually experienced' (Eckermann, 2000, p. 36). (emphasis added)

2.1.2 Local standards for QoL (UK)

Many local councils in England and Wales will also take measurements of the quality of life of their inhabitants in order to gauge the rich/poor and urban/rural dichotomies in their regions (and in the country as a whole) so that services can be directed to provide help where it is most needed and the impact existing services are having can be assessed (Audit Commission, 2002, p. 4-5). According to a report in 2001, the people surveyed identified six areas that were most important to making somewhere a good place to live. They were: low crime levels, and good health services, housing, shopping facilities, public transport and education provision (Audit Commission, 2002, p. 3).

Using these variables, the Audit Commission was able to create a system to be able to compare quality of life in different towns, villages and cities. Some of the data came from census reports and the Office of National Statistics, while other information was taken by conducting surveys of local people (Audit Commission, 2002, p. 9). Thirteen 'thematic areas' were agreed as the issues to be tackled by the survey and a set of 38 quality of life indicators were chosen to measure those areas. The thematic areas identified were: combating unemployment, encouraging economic regeneration, tackling poverty, community safety and social exclusion, developing people's skills, improving people's health, housing opportunities, management of the environment, and transport, and strengthening community involvement, reducing pollution, and protecting the diversity of nature (Audit Commission, 2002, p. 6-7).

The Audit Commission used the data gathered by these surveys to identify a cohesive target for which local communities could aim. The quality of life data would then be used to find areas where a community was falling short of this target, so that they could then be improved (Audit Commission, 2005, p. 3). The target identified was that of 'sustainable communities,' which the Audit Commission defined as communities that have balanced and integrated social, economic and environmental components, that can meet the needs of existing and future generations, and that respect the needs of both other local and international communities (Audit Commission, 2005, p.

3).

They identified five principles that could be used to achieve this goal:

1. Living within the environmental limits of the area
2. Ensuring a strong, healthy and just society
3. Achieving a sustainable economy
4. Promoting good governance
5. Using sound science responsibly

(Audit Commission, 2005, p. 4)

The Audit Commission also developed a framework through which local communities could use quality of life data gathered to achieve these goals. They believed that quality of life data had the following uses:

- Paint a picture of Quality of Life issues locally
- Facilitate comparisons of performance between certain areas
- Stimulate debate and raise public awareness
- Inform local sustainable community strategies and local area agreements
- Review, justify and set local objectives and priorities
- Monitor change and assess and evaluate progress over time
- Enhance partnership working, shared ownership and joint activities

(Audit Commission, 2005, p. 5)

In short, the Audit Commission developed the quality of life framework in the hopes first to generate a snapshot of how satisfied people were with their local communities, specifically in areas where the local council would be able to take some kind of action. They were then able to use this same framework in a long-term project with the intention of improving quality of life at the community level. This is an example of quality of life data not simply being used to keep track of problems, but actually to solve them. Another UK organization, focusing more on the country as a whole and which leaves the policy making to the government, is the Office for National Statistics (www.ons.gov.uk).

The UK Office for National Statistics (ONS) is a government funded organization that collects demographic, economic and social data. These data is used to keep track of the UK economy and population to better inform political policy. The most recent census, taken in 2011, included questions regarding quality of life (http://www.ons.gov.uk/about/consultations/measuring-national-well-being/index.html). It was hoped that these questions would provide information regarding national wellbeing, rather than at the individual level, as with the NHS quality of life data discussed above. The issues the ONS believe affect national wellbeing are listed on their website:

• Income and wealth
• Job satisfaction and economic security
• Ability to have a say on local and national issues
• Having good connections with friends and relatives
• Present and future conditions of the environment
• Crime
• Health
• Education and training
• Personal and cultural activities, including caring and volunteering
(http://www.ons.gov.uk/about/consultations/measuring-national-well-being/index.html, 16 July 2012)

The consultation on the idea of measuring national wellbeing (http://well-being.dxwconsult.com/) remained open until April 2011. The final report on this census is not expected until late 2013 (ONS, 2012).

2.1.3 Healthcare systems and QoL

This idea of quality of life often varies depending on the seriousness of a disease affecting health, i.e. patients suffering from cancer are, on average, more willing to forego high living standards and comfort in exchange for a treatment that might give them a longer life, even if only for a few months (Fayers and Machin, 2000, p. 12). Within any health care system, there is a need to understand how treatments being administered to patients affect their quality of life, with the intention of developing and improving treatment options. As such, the questions being asked about an individual's quality of life vary depending on the condition being treated (Fayers and Machin, 2000, p. 16).

For comparative purposes, however, the primary indicators for quality of life being assessed are: emotional, physical and social functioning, levels of pain, fatigue, and side effects of treatment, including toxicity (*ibid.)*. It is central to the idea of quality of life in medicine that the responses to QoL questionnaires must come from the patient, and it has been noted that observers are not good judges of a patient's assessment of their own quality of life (Fayers and Machin, 2000, p. 15). Because of this, a variety of questionnaires for patients have been developed to allow physicians and carers to assess and understand their quality of life. As mentioned above, the first recorded medical quality of life assessment was carried out in 1947, using the Karnofsky Performance Scale. It was a scale ranging from 0 (dead) to 100 (no evidence of disease, no complaints) and was carried out by medical staff (Fayers and Machin, 2000, p. 6). Using this scale as a base, medical and research professionals have since then developed hundreds of questionnaires and surveys in an attempt to quantify the quality of life of their patients.

More recently, the National Health Service (NHS) in England and Wales has developed a new working framework for ensuring a measurable standard of quality of life for patients over the entire organisation. The Department of Health (DOH, 2010, p. 14) (www.dh.gov.uk) has settled on a three point definition of quality focusing on, first, how effective the treatments and care given are,

second on the safety of that treatment and care, and finally on the broader experience of treatment and care of the patients and their carers (DOH, 2010, p. 6-7, and Table 2.1). The aim of these three points is to assess the structure, process and outcomes of the overall care given by the NHS, and in turn how the standards of care within the NHS affect the QoL of patients (*ibid.)*.

They have also established five domains of what the NHS should be delivering to patients, which slots into the three-point definition of quality. Under each of these domains is a set of indicators used to determine progress, five areas of improvement and a unique set of quality standards set out by the National Institute for Health and Clinical Excellence (NICE) (www.nice.org.uk) (DOH, 2010, p. 14-18).

Table 2.1: Quality of care standards for NICE (DOH, 2010, p. 14)

Effectiveness	Preventing people from dying prematurely
	Enhancing quality of life for people with long term conditions
	Helping people recover from episodes of ill-health or following injury
Patient Experience	Ensuring people have a positive experience of care
Safety	Treating and caring for people in a safe environment and protecting them from avoidable harm

The quality standards set out by NICE are measurements of quality of life for patients with specific conditions, including, but not limited to, stroke (cardiovascular accident), dementia, depression and alcohol dependence, and situations including end of life care and specialist neonatal care among others (NICE, 2010). In this way, the NHS ensures that not only is it meeting the quality standards necessary for an organisation of it size, complexity and budgetary needs, but also providing people within it with the best possible care.

2.1.4 Summary: A Range of Modern Indicators for Quality of Life

Looking at all the different ways of measuring quality of life, what it seems to come down to is living (healthily) for a reasonably long time and being able to live at a reasonable standard within society (global or local) not only by having enough money, but by having the education and socio-cultural power to have control over one's life.

Modern quality of life studies use a combination of national statistics, individual census data, and personal questionnaires. While there are estimates for population statistics, there was no Office of National Statistics in Medieval England, there are no concrete data for population numbers, much less the kind of detailed accounts required for both the WHO and UNDP reports. Similarly, while there are personal accounts written by individuals in the past, they were not written for the purposes of understanding past quality of life and so do not address some of the key issues and questions future researchers have about the lives of the author and their community.

The types of information available to historians and archaeologists that can be used to explore past quality of life will be discussed in the following section.

2.2 Examples of Envisaging Quality of Life in Past Populations

It is inevitable that studies of the QoL of living populations will use different kinds of evidence and a greater range, as discussed above, when compared to what is possible for past populations. Widespread modern surveys regarding household income, causes of death and general happiness are not directly accessible in archaeology. As such, archaeologists require a wide range of different types of data, including human remains, artefacts, and documentary sources, to form an idea about the quality of life of different communities within a larger population.

The lines of evidence open to those studying the past include examining plant and animal remains (ecofacts) from archaeological sites which may give clues to the diet of the individuals living there, exploring buildings and artefacts that may suggest social status within a particular society, reading through various contemporary written records for clues to lifestyle, analysing local and regional landscapes, and, arguably the most direct method, analysing the skeletal remains of buried individuals in order to determine demographic and disease profiles for a particular community.

Roberta Gilchrist (2012, p. 3) argues that 'social value *can* influence the experience of ageing on an individual level' in her recent book on exploring the medieval life course. Similarly, social status, i.e. wealth and class, and social value (defined here as the value placed on an individual's contribution to society), would also have affected the quality of life of medieval peoples, regulating the access they had to wealth, food, property, and other necessities. As such, the social status of the different types of religious houses will be discussed.

The following sections outline some of the types of potential information present from archaeological excavations that may be used to describe QoL and briefly discusses the evidence that will be examined in this research. By studying artefacts and other materials representing the lives of past populations, archaeologists attempt to establish what each object was used for and how it illustrates a community or individual's life. In this research, these objects have not been studied in order to understand how each was used and how it influences or is influenced by life directly, but rather to use them as an assemblage or group to establish that community's access to resources, specifically high status resources, in comparison to the other communities in this research.

The communities being viewed are not according to each individual "house", but rather represent the series of typologies into which each house fits, i.e. urban, rural, male, female, etc. In comparing each type of community, it may be possible to assess which communities had the greatest

likelihood of providing a good quality of life to their inhabitants relative to others.

2.2.1 Reconstructing Quality of Life through Archaeological Artefacts

The artefacts used in this research come from the class of artefact normally referred to as 'small finds' in field reports. They include personal items, tools, and other objects used in a person's daily life. They do not include building materials. Hinton (2005) is probably the most well known archaeologist who specialises in studying artefacts for information relating to the medieval past, usually as status markers. His book *Gold & Gilt, Pots & Pins* not only contains a great deal of specific information about trends in jewellery and other forms of personal adornment, as well as less obvious kinds of artefacts, for use in identifying high status, but also practical information on dating and theories surrounding the use of artefacts in archaeology.

He notes that from the eleventh to the thirteenth century, personal jewellery became an ever more popular way for people to identify themselves as belonging to a higher social rank. 'Costume and display became…a means for the better-off to disassociate themselves from the poor' (Hinton, 2005, p. 205). It was also used to align oneself with religious piety, perhaps by having a religious engraving or emblem, with a particular family or allegiance to a particular cause (*ibid., p. 1*91, 220). Chaucer's prioress, although a late example of this trend having been written in the fourteenth century, wore both a rosary, 'of small coral…gauded all with grene' and brooch, 'of gold ful sheen' (Chaucer 1894 158-62). The ring/brooch is inscribed with the motto, 'Love conquers all' (Hinton, 2005, p. 227; Hodges, 2005, p. 83; Chaucer 1894, p. 162). The rosary is described as being made up of coral beads, a stone often reputed to have medicinal powers in the medieval period (Hinton, 2005, p. 97; Hodges, 2005, p. 100). These items all reflect both the prioress's piety, but also reinforce her wealth and station, a message clearly conveyed by her expensive clothing (Hodges, 2005, p. 83-4). Were either of these artefacts found archaeologically, they would point to both the religious and the status messages being given.

A less obvious kind of artefact useful in determining social status is that of kitchen equipment. Hinton (2005, p. 178), when he is discussing the 11th and 12th centuries, initially states that pottery and kitchen equipment do not make a statement about social status, not by virtue of their mere existence anyway. He does note, however, that by the 14th century, certain cooking trends were becoming more popular with increased wealth that can be identified archaeologically, including the addition of sauces to a meal. Instead of simply roasting a cut of meat on a spit, the drippings were now being caught in pans specifically purchased in order to make sauces (Hinton, 2005, p. 236). These purpose built pans would have been too expensive for most people and would have been purchased by individuals with a desire to show off both their status, but also their awareness of the latest trends in food preparation and presentation (*ibid.)*. Several such pans were uncovered at Kirkstall Abbey, Leeds, all of which were associated with the various kitchens within the monastic estate (Moorhouse and Wrathmell, 107-8).

In Duncan Brown's 1997 article, he explored the significance of different kinds of pottery of early medieval Southampton. Brown used imported versus locally produced goods to differentiate between various social strata. He found that there was far more pottery found at sites associated with high status, he suggested that 'wealthy people would have used fine tablewares most frequently, and thus consumed them at a greater rate' (Brown, 1997, p. 99). In this way, not only were the kinds of artefacts being found indicative of high status, but also the overall consumption patterns.

Similarly, by comparing the number and types of glass vessels found at various sites in England, dating from 1200-1500, Rachel Tyson used her PhD thesis to explore status through consumable objects (Tyson, 1996). She analysed glass from monastic sites, castles, manor houses, palaces and towns to explore the prevalence of glass found archaeologically at socially differentiated sites (*ibid.)*. She found, not unexpectedly, that glass was found predominately on wealthier sites, castles, palaces and manor houses, and that the most common object represented was tableware, especially in the 13th and 14th centuries, indicating a level of conspicuous consumption, i.e. showing off to visitors that you can afford glass tableware (Tyson, 1996, p. 111, p. 158). Of the monastic groups, she found that the friars had the highest percentage of glass, mostly for domestic or medicinal use (*ibid., p. 1*02).

It is the goal of this research to expand this idea into looking at a wider range of artefacts and how the assemblages of different types of monastic institutions vary according to status, wealth, and ideology. As with Brown and Tyson, it would be expected that monasteries and nunneries with more wealth would have owned objects that could convey that wealth to their visitors. However, one of the central ideals within the Benedictine Rule was that of poverty, although a common criticism of monastic institutions during the medieval period was of failing to follow this particular vow (see section 2.3.4).

The author of this thesis found in her Master's research that there were differences in the artefact assemblages found at medieval monasteries in Yorkshire, primarily between urban and rural institutions, but also some differences between the older and reform orders (Tallyn, 2007). This study found higher proportions of dress accessories and jewellery in the urban assemblages and attributed this to lay people having more frequent contact with the monks at these institutions as well as a higher level of access to urban monastic estates (Tallyn, 2007, p. 60). These higher proportions could also indicate, as both Tyson and Brown have suggested in their works, that the individuals associated with these urban institutions were more inclined to display their wealth than their rural counterparts (Brown, 1997; Tyson, 1996).

Limitations

However enticing it is to draw conclusions about people's behaviour based solely on the artefact assemblages, there are limitations to all archaeological data and these must be taken into account when making those conclusions. Artefacts represent objects that were buried with, discarded, or lost by people in the past. They do not represent the whole of those people's possessions, only a proportion and an unknown proportion at that (Schiffer, 1983). Additionally, the soil into which objects fall will have characteristics that impact how well different types of objects are preserved. For example, highly acidic soil will break down most artefacts and that iron artefacts are at risk of being completely destroyed in well-drained soils and a recent study found that iron artefacts were more likely to be corroded in urban environments, due to the deposition of urban waste and rubble (Gerwin and Bumhauer, 2000, p. 75). As such, different sites may have different types of artefacts associated with them, not because the behaviour of the people living there particularly differed, but rather that the soil selectively preserved objects.

A second limitation of using artefacts to draw conclusions about several sites is that each archaeological site will be excavated differently, using a variety of tools and methods, and may not be excavated equally, meaning that some sites will be excavated in their entirety (although this is rare) and others will only have certain aspects excavated (Graesch, 2009; Dibble et al., 2005; Hiscock, 2002; Gnaden and Holdaway, 2000). For example, the Priory of St Andrews, York was excavated virtually in its entirety because of the fact that the whole area was going to be built on, while the excavations of Hulton Abbey, the Priory of St James, and Nunnaminster focused primarily on various areas of the churches and some small forays into the cloister in the case of Nunnaminster (Jackson, 2006; Klemperer, 2004, p. 13-5; Kemp, 1996, p. 47; WMS, 1981; WMS, 1975).

2.2.2 Reconstructing Quality of Life through Environmental Archaeology

Environmental archaeology is typically defined as being made up of three sub-disciplines: archaeobotany (the study of archaeological plant remains), archaeopedology (the study of soil in relation to archaeology), and zooarchaeology (the study of archaeological animal remains) (Reitz and Shackley, 2012, p. 19-20). Bioarchaeology is also classed as a type of environmental archaeology (*ibid.)*.

Archaeobotany, as mentioned above, is the study of plant remains in archaeological contexts. This includes seeds, pollen, and other plant material (Reitz and Shakcley, 2012, p. 19-20; Ross and Zutter, 2007). It can be used to explore the types of plants grown and utilised at a particular archaeological site, exploring the agricultural and husbandry practices at various sites, as well as reconstructing the past landscape and environment (Reitz and Shakcley, 2012, p. 19-20; Ross and Zutter, 2007).

A study by Ross and Zutter (2007, p. 63-4) looked at archaeobotanical samples from two sites in Iceland dating that were both continually occupied between the 11th and 18th centuries and one site in Greenland dating to between 1000 to 1350 to compare animal husbandry practices in the early phases of these Norse settlements. They found that while the sheep at both the Iceland and the Greenland sites fed on heathland scrubs, the cattle at the Greenland site were also fed plants from the apophyte taxa, characteristically weedy plants (Ross and Zutter, 2007, p. 74-81). Ross and Zutter (2007, p. 84) conclude that the animal husbandry practices were largely the same at these three sites, but that the inclusion of apophytes in the Greenland cattle diet could indicate potentially poor fodder for the cattle in Greenland or a higher reliance on agriculture for fodder at the Icelandic sites.

A study of the plant remains found in the 15th century drains of a Clunaic abbey near Glasgow, Scotland found that, while the remains primarily consisted of locally grown and harvested plants (Dickson, 1996). There was also evidence of some imported items, including remains of *Myristica fragrans*. This plant is the source of both mace and nutmeg and was only grown in the medieval period in what is now Indonesia (Dickson, 1996, p. 29). The other imported food item was the pips of the *Ficus carica*, or the fig, which was a popular, but expensive, treat in its dried form (Dickson, 1996, p. 29).

The remains of figs were also found at the Cistercian monastery of St Mary Graces, London, and the Benedictine nunnery of St Mary Clerkenwell, Islington (Sloane, 2012, p. 254; Grainger and Phillpots, 2011, p. 68). The excavation at St Mary Graces found evidence of a large number of small seeded fruits, including figs, but was unable to ascertain whether these foodstuffs were grown locally or imported (Grainger and Phillpots, 2011, p. 68).

St Mary Clerkenwell, on the other hand, did not have a high volume of fruits found, which could be indicative only of the poor preservation of plant material on the site, but could also be further evidence of the poor financial situation the house was in during the 14th century (Sloane, 2012, p. 254). The high proportion of rye in the phase associated with that period is certainly suggestive of the house purchasing cheaper bread (*ibid.)*.

Archaeopedology is the study of soil in order to reconstruct past human behaviours and landscapes. An archaeopedological study of the city of Brussels has found that, prior to the city wall being constructed at the beginning of the 13th century, the land was used extensively for agriculture (Devos et al., 2009, p. 273). The type of soil identified, 'Dark Earth,' is often associated with abandoned urban sites, although there are a number of theories surrounding the mechanism for its formation, most popularly the abandonment of Roman sites or their suburbs and the lack of subsequent land use. Others, however, point out the formation of Dark Earth in areas of continuous use and suggest that the formation requires the use of formally urban land for agricultural purposes

(Macphail et al., 2003).

Devos et al. (2009, p. 282) postulate that, in this example, the soil was formed when an area that had been extensively farmed was later covered and sealed away from the drying effects of the air and sun. When a settlement is abandoned, the top most layer of the soil can seal away the lower levels, leaving behind these traces of intensive agriculture in the form of Dark Earth. In the case of the medieval city of Brussels, the rampart of the new city's walls covered the area under intense farming. This effectively sealed it from the sun and air, leaving it to transform into Dark Earth (*ibid.)*. This is an example of archaeopedology being used to reconstruct human behaviour and interaction with the landscape.

The inclusion of archaeobotanical and archaeopedological remains was never considered for this research, as the sites included were not all excavated in such as a way as to identify and study these materials (Barber, 2006, p. 182). (Additionally, there is no mention of sieving or soil testing carried out in the excavation notes of Clementhorpe Priory or Nunnaminster.) Originally, however, it was hoped to include zooarchaeological material in this research, but due to the limited analysis done on the zooarchaeological remains at some of the sites this was not possible (WMS, 1981-3; Brinklow, 1977; WMS, 1973).

Zooarchaeological data could have been used to assess diet in particular for this research, with the hope that social status and potentially wealth could also be explored. Crabtree (1990, p. 156) writes in her overview of the importance of zooarchaeology, that animal remains can be used to explore trade networks, social inequality, and identify ethnic groups in complex societies, in addition to diet, economy, and the use of animals within a community. According to Crabtree (1990, p. 160-168), urban centres and high status estates are identifiable as sites associated primarily with consuming animal products, but not producing them will be characterised by a more narrow range of species, a higher concentration of domesticated animals, and evidence of selective butchery (i.e. smaller animals, different age ranges, and different elements represented).

Medieval eating habits, discussed below (Section 2.3.1), could vary considerably depending on socio-economic status, region, sex, and religious belief. Similarly, different regions would have had access to different foods as the local land was better suited to growing one type of grain over another (Dyer, 1989, p. 154). Differential access to food based on sex was not unknown. Some medical and theology writers believed that red meat, for example, should not be eaten by women as it made them too aggressive or 'mannish' (Bynum, 1987, p. 191). Medieval Christianity had strict dietary rules involving when the eating of meat was allowed and when people should substitute it with fish (Hammond, 2005, p. 18-9). These practices will be discussed in more depth below, but are worth mentioning here as differences in the make up of faunal remains at archaeological sites from medieval Europe can reveal clues to the socio-economic standing and possible religious

devotion of the people who lived there.

In his survey of English medieval urban and rural sites, Albarella (2005, p. 133) found that in urban sites the highest represented animal was the cow, followed closely by sheep and lastly by pig. In rural sites, he found that sheep was the highest represented, followed not particularly closely by cattle, and again lastly by pig. He concludes that this is probably partially due to the fact that beef was a high status food and there are more likely to be more high status households in towns versus country (he excluded manor houses and castles from the study), but also that beef was perfect to sell as there is too much meat on a cow for one household to consume. In other words, it was more economical to sell beef than to try and consume it before it "spoiled" (Albarella, 2005, p. 134). Albarella also reports that the distribution of the sexes can also reveal information about producers versus consumers. He found that more male pigs were found at high status or urban sites, concluding that the surplus young, male pigs would have been sold off, while the females would have been kept until their breeding potential ran out before being consumed (Albarella, 2005, p. 141).

This is an example, not only of producers vs. consumers, but also of differential access to meat in relation to social status, AND especially the different cuts of meat being consumed, the range of animals being consumed and the proportion of those within the total assemblage (Crabtree, 1990, p. 171). The consumption of birds, for example, is more commonly associated with castles, manorial sites and religious houses (Serjeantson, 2006, p. 133; Albarella and Thomas, 2002, p. 24).

Wild birds especially are associated with high status in the medieval period, both as food and as pets (Serjeantson, 2006, p. 144). A popular pastime of the aristocracy was hawking or falconry, in which a trained bird of prey was used to hunt other birds (Albarella and Thomas, 2002, p. 35). This was an expensive hobby and was also outlawed for those who were not members of the aristocratic class (Serjeantson, 2006, p. 146-7; Woolgar, 2006, p. 199).

By exploring the species representation at a particular site over a period of time, it is possible to use the presence or absence of both high and low status foods to track changes in the fortunes of a manor or, in this case, a religious house. The nunnery of St Mary Clerkenwell, located in Islington, was a middling income house that suffered a period of financial troubles in the 14th century, only to have their fortunes change in the late 15th century until the Dissolution of the nunnery in 1539 (Sloane, 2012, p. 257), This is reflected in the zooarchaeological evidence by the absence of high status animals, including rabbit, venison, goose, and swan during that 14th century, but the resurgence of said animals in the final phase of the nunnery (Sloane, 2012, p. 257).

Crabtree's (1990) final area identified as important to faunal research is that of identifying and defining ethnic distinctions within a society or culture. This area can be very important to medieval archaeology, with both the Muslim and Jewish communities practicing very different diets than their Christian counterparts (Mundee, 2010 discussed below in 2.2.3 iv). Additionally, the ideal monastic diet, as prescribed by the Benedictine Rule, should have been different from a layperson's diet. Monks and nuns were not supposed to consume any flesh with the exception of fish. Lay people were expected to refrain from meat other than fish only during lent and so it would be expected that the faunal make up of the different types of sites should be very different. This theory falls prey to one of the limitations of zooarchaeology, specifically a limitation relating to sieving.

As with the rise and fall of other zooarchaeological material, the increase of herring in the 14th century assemblage of St Mary Clerkenwell, Islington, followed by a decrease in the 15th century phase can be taken as a reflection of the changing fortunes of the house (Sloane, 2012, p. 259). Similarly, the increase of eel in that final period is also suggestive of the nunnery's success (*ibid.)*. A high proportion of eel remains (57%) at the Cistercian monastery of St Mary Graces, London, was similarly concluded to be evidence of the high status of that particular house or of the manor house that was built on the same ground following Dissolution (Grainger and Phillpots, 2011, p. 72).

Limitations

One of the main issues relating to faunal analysis, especially relating to bird and fish bones as indicators of food, is whether soil from an excavation is sieved. If it is not, it is likely that most bird and fish bones will not be collected (Serjeantson, 2006, p. 133; English Heritage, 2002, p. 15-6). As such, a high prevalence of fish bone in at a monastic site in comparison to a lay site may not be discovered at all. This is further clouded because of the delicate nature of fish bones in general, many fish that were consumed at this period (and are still consumed today), like herring or mackerel, have bones that are so small and delicate that people simply eat them and their own stomach acid destroys them (citation).

It is not just the smaller animals that will be missed; it is also the plant remains. Unless an excavation specifically intends to look for plant remains, such as seeds, or other micro remains, such as pollen, they will probably not be recovered, as only wet sieving will allow them to be identified and this is not a process used on every site and especially not on older excavations (Moffet, 2006). It is for this reason that plant remains are not being used in this research as a piece of evidence for reconstructing diet, as not all of the excavations carried out sieving (Barbaer, 2006, p. 182) or, if they did, it was not noted in the excavation notes (as per WMS, 1981-3; Brinklow, 1977; WMS, 1973)

While the presence or absence of high status artefacts can also be used to assess social status (Hinton, 2005, p. 205), so can the remains of plants and animals. However, Moffet states clearly that using only archaeobotanical remains to determine social differences is difficult or impossible (Moffet, 2006, p. 55). She begins by explaining the various circumstances under which plant remains can be preserved, including charring, waterlogging, and mineral replacement (Moffet, 2006, p. 41-42). The most commonly preserved remains are those of cereals, which formed the basis of the medieval diet and incorporated into either bread or ale (Moffet, 2006, p. 43).

It is clear from the above that high status, wealth, and quality of life are not always immediately clear using only archaeological data. Sampling biases may prevent some information from being identified and assessed. As such, it is important to use as many lines of evidence as possible, and that includes documentary and bioarchaeological materials.

2.2.3 Reconstructing Quality of Life in Bioarchaeology

(i) Bioarchaeological Studies of Health

A study similar to Higgins et al. (2002) (19th century New York alms house) where documentary data are used to support a study health in of a group of individuals is that of Sledzik and Sandberg (2002), as a component of the Global History of Health Project. They researched the effects of military service on the health of a group of 18th and 19th-century soldiers from the U.S. from four sites, as well as their health prior to joining the service (Sledzik and Sandberg, 2002). The goal of their study was to test the idea that, although the army only admitted the healthiest men, by the time they left (or died) they were "physical wrecks" (*ibid.)*. By looking at the documentary evidence for diet during the campaigns these men served in, it was found that the calories consumed would not have met their energy expenditure; in short, they were starving (Sledzik and Sandberg, 2002, p. 191-4). The health of the individuals during their lives before joining the army, as suggested by their stature, dental health and lack of conditions associated with poor nutrition during development, was higher than average. This is supported by the documentary accounts that state that only the strong and healthy were allowed to join the army (Sledzik and Sandberg, 2002, p. 194-205). However, other skeletal lesions, dental caries and the high presence of porotic hyperostosis, suggest that, as adults, their nutrition was less than optimal (*ibid.)*. The authors take this as evidence that the lives of the soldiers in 18th and 19th century America were very difficult. 'For most of the soldiers included in this study, the bullet that killed them was just the last, if the most serious, in a long series of physical insults' (Sledzik and Sandberg, 2002, p. 205). While they admit that it is not a terribly surprising conclusion that life in the military was hard, the impact of that hardship on their bodies, led the authors to seriously question why anyone would want to join the army (*ibid.)*.

Equally unsurprising is the conclusion that industrialisation had a detrimental effect on people's health, especially children. Lewis concluded in her, 2002 study of child health over 1,000 years that

industrialisation had the greatest impact on child health, above and beyond differences between the health of urban and rural children (Lewis, 2002, p. 222). She found that even socioeconomic status did not buffer children from the hazards of industrialisation (*ibid.)*. By examining a total of 831 individuals under the age of 17 from four different sites, spanning the period from the 9th to the 19th century for evidence of variation in health, Lewis sought to identify the factor that played the biggest role in juvenile health (Lewis, 2002, p. 212). By comparing age at death, skeletal growth profiles, and several non-specific indicators of stress (including cribra orbitalia, metabolic diseases, periostitis, enamel defects and sinusitis) it was found that there were only minor differences between the health of children in urban and rural areas (Lewis, 2002). Perhaps most interesting is that sinusitis and other respiratory infections were actually higher in the rural population, which Lewis concludes was the result of breathing in harmful substances in soil along with the smoke from open hearths (Lewis, 2002, p. 221). However, the most drastic differences began to occur during the Industrial Revolution, the most striking of which was the dramatic increase of the metabolic diseases of rickets and scurvy (*ibid.)*. Although documentary sources suggest that living in medieval urban centres was more harmful to children's health than living in the countryside, Lewis found only minor differences. She concludes that 'it was not until the Industrial Revolution that the urban environment began to have a real impact on child health' (Lewis, 2002, p. 221). This is a perfect example of the necessity to be critical of documentary sources and to archaeologically and/or bioarchaeologically test, whenever possible, the claims found therein.

Very often, however, there are no documents associated with a particular site or culture. This may be because they simply do not survive or because the society or culture had no written language. For example, in the Georgia Bight (an area spreading from Northern Florida to Southern Georgia, USA) the native population had no written language, so information about their society must come from archaeological material. By looking at the skeletal remains from 47 sites within the area, Larsen et al. (2002, p. 409-413) examined the impact different events or changes had on the health of the people of that region. They divided the sites into four different time demarcations, pre-contact pre-agriculture (1100BC-AD1150), pre-contact agriculture (AD1150-1550), early (AD1550-1680), and late (AD1686-1702) contact (with Europeans).

They compared demography, skeletal growth patterns, dental development and health, anaemia levels and rates of infection between these four groups (Larsen et al., 2002, p. 414). They found that, between the first, second, and third periods, the demographic pattern showed a larger number of younger individuals, which they interpreted as an increase in the birth rate. This increase in younger individuals, however, was not found between the third and fourth periods (*ibid.)*. It was also found that growth rates and average stature were highest in the pre-contact pre-agricultural period, which declined steadily over time, with a slight increase in the final period (*ibid.)*. These would indicate that overall health and nutrition levels were highest in the first period, but this period was also marked by the highest levels of enamel hypoplasia, indicating periods of poor

nutrition during an individual's lifetime (Larsen et al., 2002, p. 417). Other indications of nutritional stress, including cribra orbitalia and porotic hyperostosis, and rates of non-specific infection showed an increase over time, suggesting that overall community health was becoming poorer over time (Larsen et al., 2002, p. 422-5). Using the GHHP calculations, this study found that the pre-contact pre-agricultural period had the highest quality of life, followed by the early contact, the pre-contact agricultural and, finally, by the late contact (Larsen et al., 2002, p. 433). The authors concluded that the European contact period was detrimental to the health of the American native populations, but also that, without documentation of important events and changes, it is possible to assess the impact those events and changes have on the health and well-being of a community or population (Larsen et al., 2002, p. 435).

Other mysteries about non-literate societies may also be explored through archaeological or bioarchaeological studies, such as the one noted by Eisenberg in her 1991 article about a native culture in Tennessee, USA. This society lived in an area known as the Nashville Basin, an area that encompasses modern day Nashville, during the late prehistoric period AD 900-1450. Before contact with Europeans, the population appears to have suddenly left the area. Eisenberg (1991, p. 115) sought to explore whether health stress influenced this move. Her sample consisted of 888 individuals, the vast majority of which were adults, dated to the period between AD 1275-1400 (Eisenberg, 1991, p. 116). She found that, during this later period of settlement, the most nutritionally compromised and at risk for infection were the youngest segment of the population, the children. She estimates that the life expectancy at birth was 17 years for males and 14 years for females (Eisenberg, 1991, p. 119). Eisenberg goes on to make some carefully hedged claims about what could have caused these high infection loads and nutritional deficiencies, but does not compare this period to any before it, making conclusions about the abandonment of the site difficult to draw (*ibid.)*. It is unclear if this is because the work had not yet been done, or if there simply were not enough surviving skeletal remains from the earlier periods to carry out a large-scale investigation.

(ii) Biological Studies of Status

Moving away from the health of a population, but also relevant to the current research, many studies are interested in identifying the different social strata, i.e. high and low status individuals, within a single population. The primary way that people explore status in bioarchaeology is to see if certain disease markers, that are believed to be indicative of high or low status, agree with the archaeological evidence from the site.

Pechenkina and Delgado's, 2006 study exploring social status in a Peruvian native community, use the logic that those who were high status will have less evidence of nutritional deficiencies than low status individuals. In their limited study of 64 individuals from the Early Intermediary Period (100BC-AD100) in central Peru, they examined a variety of health markers, cranial deformation

and funerary materials in an attempt to identify individuals of different status (Pechenkina and Delgado, 2006).

A study by Jankaukas (2003) was looking specifically for high status subgroups by examining a skeletal condition thought to be associated with high status diets, diffuse idiopathic skeletal hyperostosis (DISH), within Lithuanian communities from the Iron Age, medieval and early modern periods. Using archaeologically determined social status, included quantity and quality of grave goods (first millennium) or burial location with reference to the church (second millennium), Jankaukas explored the frequency of DISH within each social group (Jankaukas, 2003, p. 291).

Another study exploring status is that concerned with the Pontecagnano cemetery of Southern Italy (9th-3rd centuries BC), where the skeletal remains of the 370 individuals and their associated grave goods were examined (Robb et al., 2001, p. 215). It was hoped that information on status from bioarchaeology and artefacts would agree (ibid.).

In terms of the agreement of the bioarchaeological evidence and the archaeological evidence agreeing, these three studies varied in their conclusions. Pechenkina and Delgado (2006) were able to identify two subsets of people within the overall sample, which had significantly different diets and nutritional levels. Under the assumption that both groups were exposed to the same pathogen levels, the fact that a subset of the population appeared to be less able to fight off infection than the other was interpreted as another indication of these two groups having some kind of real world difference between them. These differences were also interpreted as having a profound effect on their adult stature (Pechendina and Delgado, 2006, p. 232). However, both groups had markers associated with high status and, as such, it was concluded that the differences were not the result of status, but rather of the blending of two communities (ibid.).

Jankaukas, however, found that, although there was no pattern over time, there were significantly more examples of DISH within the higher status groups (Jankaukas, 2003, p. 291) and concluded that later adult males of higher status were far more likely to develop DISH than any other group, although the presence of DISH does not automatically indicate high status on an individual level (Jankaukas, 2003, p. 291-2; Rogers and Waldron, 2001).

Finally, Robb et al.,(2001) found that, compared statistically, there was ‘little systematic relationship’ between biological status and archaeological status (Robb et al., 2001, p. 218). The authors had three conclusions: that there does not need to be a correlation between funerary treatment and biological status, that the patterns that were detected suggest that more needs to be done using cross-sub-disciplinary studies, and that skeletal analysis must be ‘contextualized socially and historically’ in order for any conclusions to be drawn, an issue that will be discussed further below (Robb et al., 2001, p. 220).

So these two of these three different studies concluded that biological status can disagree with archaeologically determined status. One ascribing the disagreement on population movement (Pechenkina and Delgado, 2006) and the other on a lack of understanding of cultural processes (Robb et al.. 2001)). The third study found that, although a single disease cannot be used to predict high status, there are diseases that are found in higher frequency among groups archaeologically determined to be high status (Jankaukas, 2003).

Both Robb et al. (2001) and Pechenkina and Delgado (2006) faced difficulties in their studies do to a gap in their understanding of the groups they were studying. This was not the result of poor research, but rather recognition that more work was needed before a full understanding of how status was represented among these groups. While Jankauskas (2003) was able to achieve the goal of matching up the bioarchaeological and the archaeological evidence, he notes that the complex aetiology of DISH makes it difficult to make any conclusions about the impact the high status of the individuals actually had on the development of the condition.

In terms of quality of life studies, social status, as determined both archaeologically and bioarchaeologically, can be used to comment on the socio-economical influence of a particular group within their own culture. It is one of many factors that can be used when comparing the quality of life of two subgroups within a society, although it must not be mistaken as the sole contributing factor of the socio-economical aspect of quality of life. In all three examples, there was considerable difficulty reconciling perceived social status with biological markers of health, illustrating the point that social status is only one aspect of an individual or group's quality of life.

(iii) Importance of Population Studies vs. Study of Individuals

Bioarchaeological studies are an invaluable tool in assessing the health and/or status of an individual or a community. The presentation of a 'case study' of an individual with unique or interesting characteristics of burial, physiology or pathology is popular in bioarchaeology (and medicine) and has its uses. Case studies are particularly useful in the discussion of the symptoms, signs, and outcome of specific diseases. However invaluable case studies are in the understanding of particular diseases or conditions, they are only one aspect of the study of bioarchaeology as a whole. It is the goal of archaeology, and bioarchaeology as a subset of that, to study past societies as a whole and it is for this reason that population studies within bioarchaeology are so important.

In 1997, Mays undertook an evaluation of the types of articles being published in the field of bioarchaeology, looking at seven journals from four countries, including the UK, the US, Japan, and Germany. He found that the UK showed 'a heavy bias towards paleopathology,' or the study of diseases in the past (Mays, 1997, p. 601). He attributed this to the strong medical background of people working in the discipline in the UK. In the US, although palaeopathological studies

comprised the majority of articles published, normal variation studies (as opposed to abnormal variation, or pathological) in skeletal populations received more attention than in the UK. In Japan and Germany studies on normal variation comprised the majority (Mays, 1997, p. 602).

Of the palaeopathological studies in the UK, 55% were case studies, articles written about the manifestation of disease or a condition in an individual skeleton. Mays (1997, p. 603) also attributes this focus to the strong medical influence in UK bioarchaeology. US palaeopathological articles had no clear majority, but 44% of the articles published were population studies with only 29% being case studies. In Japan, the majority of palaeopathological studies were case studies (73%), but as there were only 11 studies in those seven journals it is clear that the focus of the discipline of bioarchaeology is not in palaeopathology. There were also only 11 palaeopathological studies published in Germany as well, with 27% being case studies and 36% being population studies (Mays, 1997, p. 603).

In 2010, Mays (2010, p. 196-197) revaluated the same journals to assess whether there were any changes in trends. He found that papers published in UK bioarchaeological journals were still overwhelmingly focused on paleopathology and mainly on case studies. The most significant change, according to Mays (2010, p. 199), was the rise in studies relating to bimolecular studies (aDNA, stable isotope), which he suggests is the result of a rise in funding for that kind of research. Mays (2010, p. 200) concludes, however, with the assertion that things must change in bioarchaeology, that the case study has its place but that '[f]or a case study publication to be worthwhile, the specimen needs to have some wider significance.' There is a need within UK bioarchaeology for a stronger focus on population-based studies.

Population based studies are important because a case study can only tell you about an individual, a single person who may or may not have had a particular disease or condition. Population based studies can be used to explore dietary patterns, rates of disease or condition between subsets of that population, including age at death, sex, status, etc.

An especially pertinent example of a population study to this research is that of Keeping's (2000) doctoral thesis, in which she compares frequencies of specific health indicators in the skeletal populations of medieval nunneries, monasteries and lay cemeteries. Her focus was on the health of the individuals buried at nunnery sites and how that compared with the health of individuals at both monasteries and within the lay population. Although similar to the present research, this dissertation did not draw widely, due to time constraints and the necessity to conduct primary analysis of human skeletal remains, on the archaeological or documentary evidence from any of the three sample populations being studied or explore the regional differences. This is not intended to be in any way disparaging; Keeping's sample sizes were larger than the present study and she did original skeletal analysis rather than relying on data in site reports that may be ambiguous and

incomplete. She concluded, among other things, that the individuals buried in the nunnery cemeteries had a higher standard of living, based on skeletal indicators of disease, than those buried at either the monasteries or the lay cemeteries (Keeping, 2000, p. 200). Keeping's study compared three different sections of a population in order to draw conclusions for the society as a whole. In many ways, this research project builds on the work of Keeping's thesis, although this was not a motivating factor in the planning stages.

Other population studies focus on individuals from a single cemetery population in order to draw such conclusions. For example, Vercellotti et al..'s (2011) recent examination of body proportion and social status is an interesting example. The population of the medieval cemetery at Trino Vercellese had the benefit of being clearly demarcated by social status, by those who could afford to be buried within the church and those who were buried outside it (Vercellotti et al., 2011, p. 205). They examined a total of 52 individuals and calculated their stature, body proportion (the ratio of limb bones between each other and in relation to the trunk), and body mass (using a measurement using the femoral head diameter) (*ibid.)*. These are all traits that can have both genetic and environmental components, i.e. an individual's stature is set both by the genes they inherit from their parents, but also by their diet and living conditions during growth. They were hoping, therefore, to find evidence of low status individuals showing signs of long-term poor quality of life, which was found, but only in relation to the males. The females in the population did not appear to have been as greatly affected by their diet and living conditions (*ibid., p. 2*09).

Vercellotti et al. (2011, p. 212) concluded that their study supports the idea of women having greater defences against environmental forces by virtue of having two 'x' chromosomes. This theory has been used in other bioarchaeological, as well as clinical, studies as an explanation for the greater longevity of women in relation to men (Ortner, 1998). Although it is currently the best supported theory for female longevity, it has not been completely confirmed in the mammalian world. There are several species, included the guinea pig and Leadbeater's possums, where the male lives substantially longer than the female (Austad, 2006, p. 89-90). Even so, according to Austad, an expert in the aging process, the chromosome theory or heterogametic sex hypothesis is the best available at the moment (*ibid., p. 9*2).

Other single population studies will use data from individuals from one cemetery to explore prevalence rates for particular diseases or conditions in that population as a whole. For example, Ward et al. (2010) studied a cemetery population from Wharram Percy (a North Yorkshire medieval village in England) to explore the relationship between the vertebral disorder spondylolysis and reduced intervertebral distances, the space between the vertebrae that houses cartilage that provides cushioning and support to the bone. Reduced intervertebral distances could be an indication that, for whatever reason, there is not as much cushion and support for the vertebra as is found in other individuals. Spondylolysis has typically been associated with hard labour in

bioarchaeology, but this research, and that of others, suggests that individuals who had smaller than average intervertebral distances are more likely to develop it (Plomp et al., 2012, p. 159; Ward et al., 2010, p. 279). This conclusion supports modern clinical hypotheses (*ibid.)*. As modern clinical tests rely primarily on radiographs, archaeological studies can often be used to corroborate their findings. Had this only been an individual case study of Schmorl's Nodes, it would not be of any statistical significance because a single individual may be purely anomalous and not represent the population as a whole, but data from a large group of people presents a trend. Comparisons of such data between populations thus provide a more representative picture of health in the past.

Probably the largest scale population study of health is that of the Global History of Health Project (GHHP), headed by Richard Steckel, Paul Sciulli and Jerome Rose (Steckel et al.. 2002) (global.sbs.ohio-state.edu). Although this study, and others discussed in this section and the following one, does not relate directly to the time period or region that this research focuses on, it provides comparison to this research on the methodological and theoretical basis, in that they seek to explore people's lives and health at the population level. The first phase of the project involved a number of authors and sought to collate demographic and disease data on 12,500 skeletal remains from the Americas and from all periods in history, along with information on the environment and context of the sites studied, in order to establish 'long-term trends in health' (Steckel et al., 2002, p. 62).

The second phase of the project concentrates on European archaeological sites. Before the project in Europe began, standards for data collection were established, along with an online recording system and database so that comparisons could be made between populations (http://global.sbs.ohio-state.edu). The project established three key principles for their analysis of quality of life, as represented in the skeletal remains. The first was that multiple indicators must be used, as it is impossible to assess quality of life on the basis of only one indicator. The second was that age adjustment based on both levels of trauma and infection must be carried out, and the third was that the severity of skeletal lesions should be recorded (Steckel et al., 2002, p. 62). By using these controls, they were able to draw conclusions about health trends for the sample populations over long periods of time. They also established a measurement of quality of life that, similar to the above discussed HDI, produces a ranking that was then used to compare quality of life for populations from different archaeological sites (see Steckel et al., 2002 for further discussion). However, as with the HDI and other composite indices, the problems with using several components to create a single comparable index apply. These include issues with weighting the various health indicators, using comparable measurement scales, and the methods used to select the components.

The GHHP's index is a combination of eight 'scoring pathologies' and the estimated age of the individual (Steckel et al., 2002, p. 63-9). None of these pathological factors are weighted, and are

assumed to have an equal influence on an individual's quality of life. Two of the pathologies are scored on a continuous scale (stature and number of teeth present); the other six are categorical (enamel hypoplasias, anaemia, dental abscesses, infection, degenerative joint disease, and trauma) and are scored on anywhere between 2 and 5 categories, depending on the condition and the part of the body being examined (Steckel et al., 2002, p. 67). These were identified as the health conditions that were believed to offer the most evidence for poor health, but also as those that are preserved skeletally (Steckel et al., 2002, p. 63-9).

McGilvray and Noorbahsh's (2004, p. 5-6) critique of the HDI and WHO indices suggests that comparing different measurement techniques can mask differences rather than measuring them. They suggest that by confining a scale measurement between two points, a method used in the HDI, hides small differences and can throw off means and averages. By lumping everything either above or below the two set points, the HDI could potentially be giving extra weight to the lowest and highest groups which McGilvray and Noorbahsh maintain that this can give inaccurate measurements (*ibid.)*.

In the case of the GHHP measurement, a similar process of comparing scale and categorical measurements, i.e. presence and absence, could offer similar problems. By comparing, for example, the age range of a population and the presence or absence of maxillary sinusitis, it could be the case that the two populations have similar rates of maxillary sinusitis in the 10-17 age group, indicating a similarity in the populations. However, by using age range as one continuous measurement or as an average, it could mask this similarity, showing only that there is a higher percentage of maxillary sinusitis in one population over another, when in actuality that population simply has a higher percentage of 10-17 year olds represented. While the hope is that this would be obvious in the lower average age of that first population, it is entirely possible that it could be missed due to a high percentage of the 45+ age group, which could skew the average age higher. Steckel et al. (2002, p. 64) suggest that through careful examination of the raw data, however, scenarios such as this one would be caught. They advocate the use of their index at the population level, adding an aggregation technique that uses 'age-specific measures of the incidence of each component or attribute in the index' and 'age distribution of person-years lived in a standard or reference population' in place of individual age at death (Steck el al, 2002, p. 66). This produces an index (0-100) that the GHHP used to compare living standards in various geographical regions over time. Their population level index suffers from the same weaknesses as the individual level index and the HDI and WHO quality of life scales detailed above. In saying that, of course, the GHHP index is being compared with the world's top quality of life scales.

There are several smaller scale studies of trends in health at the population level, which do not use composite indices to compare different populations. These studies cover a variety of time periods and geographic locations, but, as discussed above, are included because of their focus on past

living conditions and health at the population level. Similarly to Stecket et al., Cohen and Armelagos (1984) put together an edited volume of a number of studies on different populations to assess whether there was a general improvement in population health over time, specifically the move from hunting and gathering to agriculture.

Another more focused study on population level health trends is that of Roberts and Cox's (2003) work on the Britain. This book explored individuals from a number of different sites all over Britain, from the Iron Age to the modern times. The goal of the project was to assess the ways health changed over time in the British Isles. Because this was a singular study, rather than a collection of studies, the analysis of the data and conclusions of the project as a whole do not suffer from the disagreements found in Cohen and Armelagos' edited volume. Roberts and Cox found that, while overall health is a difficult and nebulous idea to define, it is possible to ascertain patterns in population health over time.

They conclude that, as evidenced by stature, the diet of most people increased from pre-agricultural populations to agricultural living, but that the gendered differences in diet first declined male stature during the Iron Age and then rebounded in the Roman period, while women's average stature did the opposite (Roberts and Cox, 2003, p. 396). Similarly, there were marked increases in dental disease found in the transition from the Iron Age to the Roman period, which then fell off during the early medieval period. These rates rise again during the late and post medieval periods as refined flour and sugar become available (*ibid.)*. While these changes over time do not shed light on all aspects of population health, they do point to key changes in people's diets, which would have affected their quality of life.

These last three population level studies of human health (GHHP, Cohen and Armelagos, Roberts and Cox) are on a much larger scale than those discussed above (Mays, Keeping, Vercelotti, Ward et al.). That being said, all three of these studies of changing health over time ensure that the conclusions being drawn are done so within the context of the society being studied. This is an important element of both individual and population focused research into health, as the response of the individual and the population to their health is going to be influenced by their culture and society.

(iv) Contextually Based Studies

When undertaking a population-based study in bioarchaeology, it is vital that that study is contextually framed within the culture and/or society in which the individuals lived. The importance of exploring contextual information cannot be understated. The goal of this kind of study 'seeks to investigate the effects of localized (sic), proximate conditions on human biologies and the linkage between these contexts and larger historical political-economic processes (Zuckerman and Armelagos, 2010, p. 20). The result is a wider understanding of the ways in which

sociocultural characteristics and changes through time affect the entire population being examined.

A conference in the late 1990s was held to discuss the importance of political and economic perspectives in human biology. The papers given at this conference were published as a book in 1998. One of these papers was written by the editors of the book, Alan Goodman and Thomas Leatherman, this chapter has become a touchstone in the argument for the contextualisation of studies in bioarchaeology. Interestingly, Goodman and Leatherman note the fields of the attendees of the conference in this chapter. They included biological and cultural anthropologists with diverse subfields, archaeologists, and *a historian* (Goodman and Leatherman, 1998, p. 5). (emphasis added) This represents one of the key challenges in bioarchaeology in that scholars from different disciplines do not attend the same conferences, and they do not communicate with each other on a regular basis, although there have been efforts to change this (see Roberts et al., 2002; Palfi et al., 1999; Dutour et al., 1994). Goodman and Leatherman go on to discuss the importance of contextualisation and multi-disciplinary based studies. They pointed out that many biologically based studies in archaeology focus on changes within population health or living standards, but do not sufficiently enquire into what could be causing this change. 'Most research…still fails to assess the roots of socioeconomic variation or historical forces of change' (Goodman and Leatherman, 1998, p. 16). However, through the use of new scientific methods, such as aDNA or isotopic analysis, bioarchaeology is increasingly discovering more and more about the lives of people in the past. Despite these advances, when the data are interpreted without information about the cultures from which the people came, they are little more than descriptions of a new scientific technology (Goodman and Leatherman, 1998, p. 15).

A recent study using aDNA conclusively proves the existence of leprosy within the skeletal population of the medieval leprosy hospital of St Mary Magdalene in Winchester (Taylor et al., 2013). This article, while fascinating, does not particularly explore any historical documentation of contemporary views of those suffering of leprosy, choosing to focus on the methodology and results (*ibid.)*. The conclusions drawn, that five of the nine individuals identified with the bony changes typically associated with leprosy tested positive for the presence of *Mycobacterium leprae,* the mycobacterium that causes leprosy (Taylor et al., 2013, p. 13-7). One of the strains identified was the ancestral strain found in the southern United States and was probably brought over by European settlers (Taylor et al., 2013, p. 16). The other strain was unknown to the British Isles, showing that it had moved further westward than previously thought (Taylor et al., 2013, p. 16-7). However, no discussion is given to the potential socio-cultural factors that may have transmitted it. As such, the article, while fascinating, does not sufficiently ground itself in the known history of the area and the disease, leaving it as a commentary primarily on the methods used.

Stable isotopes, as with aDNA, have become a popular topic within bioarchaeology, especially as a way to interpret diet in individuals from different regions/status groups. As with aDNA, these

studies are most successful when they ground their research and conclusions with an understanding of the historical and socio-cultural forces working on the population in question. A recent study on regional and temporal dietary variation in medieval Denmark used carbon and nitrogen isotope analysis of 154 humans and 6 animals to assess differences in diet from three sites (Øm Kloster, St Middel, and Ribe) with cemeteries that date from the 12th century to the 16th, although Ribe falls more between the 13th and the 15th centuries (Yoder, 2010). It was found that the large urban site appeared to have had access to a more diverse diet, including both fresh and marine resources than the rural site, whose population appears to have subsisted primarily on terrestrial sources of protein (Yoder, 2010, p. 2233).

When the documentary evidence is included in the interpretation, however, some interesting questions arose. For example, documentary sources suggested that more cattle were exported during the later period being studied, but no evidence of this was found isotopically as the diet does not appear to shift significantly over time and, in fact, the only shift is a slightly increasing reliance on terrestrial animal protein (Yoder, 2010, p. 2234). Yoder interprets this as one of two possible outcomes, either the diet of the people did not change or it did change, but they were able to substitute another animal to take the place of cattle within their diets (*ibid.)*. Interestingly, the only temporal change found was in the city of Ribe, which showed a drop in the consumption of marine resources during the middle period and then rose again in the latter period (*ibid.)*. Using the documentation available, Yoder was able to make deductions on both a change in isotope signatures seen archaeologically, as well as comment on an historical event that did not result in an actual change in diet, i.e. more cattle being exported did not result in a drop in terrestrial protein, but rather supply must have increased to meet demand to the point of surplus.

Mundee (2010) similarly was able to comment on population level variations using isotopic analysis. She explored the isotopic variations between different religious groups, using both human and animal remains. She found that, while there were urban and rural differences in the types of plants consumed, there was little difference in the types of animal proteins that made up the diets of the different regions (Mundee, 2010, p. 218-9). Similarly, although there was an expectation that the Muslim and Christian sites might have had a variation in the types of animal proteins consumed, there was no significant difference found between these groups (Mundee, 2010, p. 220). Mundee suggests that this similarity might have been due to the historical idea of *convivencia*, a concept by which all three faiths in the region, Islam, Judaism, and Christianity, were able to eat a broadly similar diet while still adhering to the dietary mandates of their faith (*ibid.)*. In this way, isotopic analysis was used to test and draw conclusions about historical ideas about medieval dietary practice.

Without historical information, either through wilful ignorance or the unavailability of sources, bioarchaeological studies can lack the cultural context that helps to interpret the data, and allows

comparative analysis. For example, Rewekant's, 2001 article on environmental influences on bone loss uses two medieval sites in Poland. The only historical information given relates to the formation and expansion of the towns and foundations of the cemeteries (Rewekant, 2001, p. 436). This is, of course, important and useful information, but the discussion and conclusion, however, make no mention of any historical or contextual information. There is an assumption, based on differing ratios relating to the remodelling of bone, that one population was living under 'worse economic conditions,' but no evidence is given to support this claim (Rewekant, 2001, p. 438). Given that the research is an attempt to ascertain whether environmental conditions affected growth and development, this is a major oversight.

That being said, all written sources must, like any other data, be examined critically. In her, 2007 article, Perry advocates the importance of critically evaluating both historical and archaeological information, as well as bioarchaeological. She suggests that the reason bioarchaeological studies do not critically examine historical and archaeological data is because bioarchaeologists have, to a certain extent, accepted their roles as 'handmaidens' to history and archaeology. That they simply accept historians' and archaeologists' interpretations and use their evidence either support or refute those interpretations (Perry, 2007, p. 488). She points out that all three disciplines, history, archaeology and bioarchaeology, are dealing with fallible forms of evidence, data that are often incomplete and potentially biased (Perry, 2007, p. 489). Similarly, Mitchell (2011, p. 87) argues that, while potentially flawed, historical documentary records being used to understand disease and how it affected people in the past provided the document (or documents) in question are reliable.

As an example of this challenge, Perry's study of the Classical Near East examined individuals from both a nomadic cemetery and a cemetery associated with a Christian church in the town of Rehovot, in what is now Israel, an example of a study that is not related to this study by time period or geography, but rather by the wider focus on comparing the health of different populations. One of the things she found was that, although the written sources relating to the region describe the local nomads as violent raiders, the high levels of trauma within that population appears to have been primarily due to accidental injury rather than interpersonal violence (Perry, 2007, p. 507). She also found that their health was comparable to those of the townspeople, suggesting that the written sources were biased against the nomadic lifestyle (*ibid.)*. Perry (2007, p. 509) used this example to highlight the potential bias present in archaeological, including bioarchaeological, sources, but goes on to stress that the use of written and archaeological sources in contextualising bioarchaeological evidence is vital.

By using information relating to cultural and environmental factors and ensuring critical evaluation is used when drawing conclusions from macroscopic and microscopic analyses of skeletal material, information about the lives of people in the past may be inferred. A paper by Polet and Katzenberg demonstrates this perfectly. They used both carbon and nitrogen stable isotope analysis to assess

aspects of the diet of people from two medieval monastic cemetery population at Dunas Abbey, Kokijde, Belgium (Polet and Katzenberg, 2003, p. 525). They found that the individuals buried at the monastery had statistically significantly higher nitrogen levels in their bone collagen than people buried in two medieval lay cemeteries from further inland, although both groups came from sites with associated rubbish pits filled with fish bones and shells (Polet and Katzenberg, 2003, p. 529). High levels of nitrogen can be caused by a diet rich in marine food, including fish and shellfish, and this corroborates the recommendations made by St Benedict that monks should supplement fish for meat in their diets. The monastic population being studied was also found to have lower than average rates for dental caries, possibly due to the high levels of fluoride that are found in seafood (Malde and Scheidegger et al., 2011; Cheng and Chalmers, 2007; Erdal and Buchanan, 2005; Polet and Katzenberg, 2003, p. 529; Dabeka and McKenzie, 1995; Sibbison, 1990; Rao, 1984). Low levels of dental enamel hypoplasias, which are formed during childhood in response to stress, in the monastic population were also used as evidence that the individuals who lived and were buried there were from a higher social status than those in the villages (Polet and Katzenberg, 2003, p. 529). By combining the analysis of dietary isotopes with an understanding of medieval monastic life and the evidence excavated from the sites, Polet and Katzenberg were able to support their conclusions that the individuals buried at the monastery had a higher social status than those buried in the village.

A study of prevalence rates of periodontal disease and caries in people buried in the London cemetery of St Mary Graces, a Cistercian monastery, found that individuals with either or both of these conditions had a higher than average risk of dying at an earlier age (DeWitte and Bekvalac, 2010). From a population of 190 individuals, it was found that there were significantly more individuals with periodontal disease or caries, or both, in each age group, leading the researchers to deduce that individuals with these conditions were more likely than the other individuals in their age group to die (*ibid.)*. The article uses bioarchaeology to assess the impact a particular disease could have had on longevity, and inferred how diet and behaviour can adversely affect an individual's life expectancy.

In addition to exploring what people ate, bioarchaeology can be useful in determining some information about the quantities of particular foods within an individual's or a community's diet. Dietary excesses can result in particular diseases or reactions within the body. For example, a diet with high levels of rich food, salt and alcohol can lead to the development of gout, a condition in which uric acid builds up in the joints, often of the big toe, leading to pain and swelling. It also leads to an inability to urinate and can lead to kidney failure (Waugh and Grant, 2006, p. 429). Another condition that has already been touched on is DISH, which is thought to be the result of a rich diet, although it is believed that this is only one of many contributing factors to the aetiology (Spencer, 2008; Jankauskas, 2003; Rogers and Waldron, 2001).

An insufficient amount of particular vitamins and minerals can also leave evidence on or within the bone. Scurvy, a disease caused by a lack of vitamin C, can lead to the development of widespread periostitis, tooth loss and pitting/new bone formation on the orbits and elsewhere (Ortner et al., 2001). Vitamin C deficiency is either because of a deficiency in the diet or an inability to absorb it (Ortner and Ericksen, 1997, p. 213). In a study of six juvenile individuals from AD 400-600 Norway, areas of porous bone were found in areas associated with chewing, specifically on the greater wings of the sphenoid, with the conclusion that these lesions were indicative of scurvy (Ortner and Ericksen, 1997, p. 218).

In a later study, Ortner et al. examined 557 juvenile individuals from four regions in the continental United States from the late pre-historic and early historic periods for evidence of scurvy, specifically on the sphenoid bone (Ortner et al., 2001). They found that 89% of those affected were under 7 years of age and that a high prevalence rate in early historic Florida could have been the result of an inability to access the fruit and vegetables that grow so well in the area. It was suggested that this was because of the European colonists, or due to cultural practices in preparing food, which can have a detrimental effect on the vitamin content of some foods (Ortner et al., 2001, p. 346-50). However, the latest thinking about the cause of the reaction on the orbits suggests that it is a result of a lack of vitamin B, although it used to be thought that it was the result of iron deficiency anaemia (Walker, 2009). Gowland and Western (2012) recently found a strong correlation between levels of cribra orbitalia and areas of Anglo-Saxon England thought to have been areas with endemic malaria. As certain types of malaria have a high association with haemolytic anaemia, a lack of red blood cells, this could possibly lead to the development of cribra orbitalia (Gowland and Western, 2012, p. 301). These studies, and the following two, are given here as examples of the importance of exploring questions of health and living conditions at the population level.

When studying a non-literate society, however, the sources for contextualization must come from other archaeological data. A recent study on prehistoric Saharan Africa found that, through the analysis of strontium isotopes, the changing climate of the area had a profound impact on mobility patterns and possible kinship relationships of the people living there (Tafuri et al., 2006). Using past archaeological studies on site distribution, settlement strategy and material culture as a framework, Tafuri et al. (2006) studied enamel isotopically in 27 individuals from seven sites from three time periods (7000-6300 BP, 6300-5000 BP, and 5000-3500 BP) to test how the strontium signature varied over time given that the middle period was considerable dryer than the other two. While acknowledging that the small sample size is problematic, Tafuri et al. (2006, p. 398) go on to find that both the earlier and later sites showed a greater variety in strontium signature than the pastoral sites. They conclude that the earlier and later groups, due to the wetter environment, were able to move around freely, while the pastoral groups appear to have needed to return to the same locations over and over again, possibly beginning a system of oases (*ibid.)*. It is clear from the wide

range of research from different disciplines drawn upon in this article that contextualising bioarchaeological studies allows for more detailed and meaningful conclusions.

Contextualising bioarchaeological studies within their respective archaeological and historical context is important. However, combining multiple data sets into one study is the ideal. One such study, discussed above, compared grave goods and skeletal indicators in order to assess the relationship between social status and biological status from a site in Pontecagnano, Italy (Robb et al., 2001). This study aimed to test the relationship 'between funerary treatment and skeletal health' in order to better understand the society, but also to give an example of joint disease analysis. The authors compared the particular health indicators and the number of grave goods found associated with each individual. They found that there was no real relationship between material wealth and measurable health, an interesting find in a society known to be socially stratified. If these two areas of data had not been combined and contextualized, it is possible that an artefact-based study could have concluded that the society was highly stratified while a bioarchaeological study would have concluded the opposite. This study is a great example of the importance of multidisciplinary-based research for contextualising studies of past cultures.

(v) The "Osteological Paradox"

After environmental and methodological issues have been taken into consideration in bioarchaeological studies, actual conclusions based on the observation of pathological lesions in the skeleton can begin. However, the question of the meaning of pathological lesions has always been a subject rife with debate within bioarchaeology. This discussion was precipitated in 1992 with the publication of Wood et al..

Wood and colleagues reasoned that only a strong, healthy individual could live with a disease long enough for it to be visible in the bone at death, whereas an individual who died quickly from a disease would not have any lesions on their bones. As such, the frailer individual would appear healthier at death as seen in their skeleton than they were in life (Wood et al., 1992). They went on to suggest that this paradox could result in hidden subsets of a population. An example of a population made up of three subgroups is given: group A represents a non-stressed portion of a population, group B a moderately stressed portion, and group C a highly stressed portion. In their example, group B all represent individuals who lived long enough with a particular stress that they developed a bony response, while group C died before such a response developed. In an archaeological context, groups A and C would have no skeletal lesions, suggesting that they did not undergo a particular stress, while group B would. In this simplified example, the highly stressed group C would be hidden (Wood et al., 1992, p. 345). In terms of this research, the osteological paradox could overturn the idea that a community with low prevalence rates of health indicators, suggesting poor environmental conditions, had a good physical quality of life. Instead of a good quality of life, these individuals may have had such a poor quality of life that they died before the

health indicators developed on their skeletons. According to Wood et al., this idea of the osteological paradox called decades of bioarchaeological research into question.

Needless to say, this article and the theory behind it sparked controversy. The following year, Goodman published a rebuttal, also in *Current Anthropology*, in which he maintained that if several indicators of stress are used, there should be no confusion between healthy and frail individuals, as the lowered age at death would identify the frail people (Goodman, 1993). He agreed with Wood et al. that a number of factors must be considered when attempting to reconstruct health in past societies and went on to call for bioarchaeologists to explore the various fields of modern epidemiology, nutrition and physiology if they want to understand how an individual or group of people responds to environmental stresses (Goodman, 1993, p. 285). Work continues today on solving the problem of hidden heterogeneity, including the use of isotope analysis (Wright and Yoder, 2003). Isotopic analysis can be used to identify individuals suffering from disease or malnutrition (e.g. scurvy), the kinds of foods an individual (or community) were eating, i.e. marine resources, land animals, plants, as well as identifying individuals who did not spend their developing years in the region in which they were buried (Wright and Yoder, 2003, p. 51). This can help to overcome some issues with hidden heterogeneity by establishing whether or not an individual did indeed have a dietary deficiency (although only specific deficiencies leave their mark on the skeleton, including the development of scurvy as a result of a lack of Vitamin C) that may or may not have been causing a particular health indicator on the skeleton.

Other issues that must be considered when using skeletons (or any other archaeological material) in order to draw conclusions about the lives of past people revolve around sampling. When carrying out any kind of non-archaeological analysis for which a sample must be drawn, ideally any individual (or object) within the total population has an equal chance of being included in that sample; this is what random sampling means (Waldron, 1994, p. 11). Within archaeology and bioarchaeology, however, no sample will ever been completely random as there are too many factors or biases that cannot be resolved (*ibid.)*. For example, the individuals in a cemetery reflect people from within a community who died and were chosen (or chose) to be buried in that particular cemetery, this could indicate that they were part of a particular social or religious group, which in itself biases the individuals being studied by future bioarchaeologists (Waldron, 1994, p. 12). Additionally, only a small proportion of those buried will actually survive to be examined, as soil conditions and burial practices influence how well an individual's remains survive. The entire cemetery will probably not be fully excavated either and, even those areas excavated, not all of the individuals will be fully excavated or completely recovered due to issues relating to the extent of the excavation (*ibid.)*.

It is also important to note that the majority of excavations carried out in the UK that uncover human remains are contract excavations, carried out in preparation of building works (Roberts,

2009, p. 22). As such, only the ground identified for building work will be excavated, leaving an unknown percentage of the individuals interred at that site unexcavated. The result of this is a potentially skewed population, as the individuals excavated could represent a particular subset of the local population, i.e. poor, rich, a particular family, etc. The particular cemetery excavated could have been informally designated for the use of a particular social group, who could have lived very different lives to the others in their region. It must be kept in mind that there is no way of knowing what proportion or section of a population is being used to draw conclusions about the whole.

Overall, with all these inherent challenges, it is surprising that any conclusions about past health can be made at all. These challenges are a consistent problem within bioarchaeology, and archaeology as a whole, and the only options are to apply as many checks and balances on the sample as far as is possible, in an effort to compensate for these biases. These checks and balances include using methods that are based on, as much as possible, known age and sex collections for demographic purposes (but appropriate for the skeletal remains being studied i.e. country specific) and basing the evidence for disease in the clinical literature, although as clinicians use a number of diagnostic criteria that are unavailable to the bioarchaeologist, this is not always possible (Mays, 2012, p. 287). Mays uses the example of osteoarthritis, which modern clinicians diagnose using only changes that are not available bioarchaeologically, including the narrowing of joint spaces and the presence of subchondral cysts, while bioarchaeologists use changes in the bone that are not visible to the clinician, including eburnation (*ibid.)*.

2.2.4 Reconstructing Quality of Life through Historical Research

The biases associated with documentary evidence have to do with more than issues with sampling. Documents, whether clerical, political, religious or private, were written with an intent that is unlikely to have included informing future researchers or interested people beyond academia about the quality of life or beliefs of people within a country, religion or community. Even writings that were intended to convey religious or political beliefs were written with the purpose of ensuring that the author's opinion was disseminated. However, by reading between the lines and using a variety of sources, it is possible to access information about the lives of people in the past (Butler, 2006; van Zanden, 2005; Higgins et al., 2002; Farmer, 2002).

For example, by examining the fragmentary canonisation records of King Louis IX of France (1214-70), Farmer studied a series of official interviews conducted by the papal delegation with the poor of Paris at the end of the 13th century in order to assess whether Louis IX was indeed a saint (Farmer, 2002). Between 1282 and 1283, 330 people were interviewed about 63 miracles that were rumoured to have happened at, near, or because of the tomb of Louis IX. Through the information gathered, the name, place of birth, current residence, and number of years living in their current residence were recorded for each witness, which comprised a unique demographic set of

information for the medieval period (Farmer, 2002, p. 7). Farmer found that survival patterns among the poor differed greatly for men and women, as did societal views towards their living conditions. The primary difference between poor men and women was that there was far more sympathy for poor women (Farmer, 2002, p. 1). Men who did not labour were thought of as 'womanly' or unvirtuous (Farmer, 2002, p. 75). Women who begged, however, were to be pitied as they were risking their chastity and modesty and needed to be protected (Farmer, 2002, p. 130). The penance asked of men and women was also different. As it was humiliating, men were asked to beg, but women were expected to perform labours (*ibid.)*.

The sympathy for poor women that Farmer found in these interviews, however, was not found in Butler's, 2006 examination of the legal cases brought against runaway wives. She explored 121 cases in the ecclesiastical court records for the dioceses of York, Canterbury, and London in which men whose wives had left them brought them to court to reclaim them and, often, the possessions they had taken with them (Butler, 2006). She notes that these cases were taken to ecclesiastical courts rather than secular courts because the matter at hand was based on a moral issue, i.e. the sanctity of marriage, and often resulted in the wife being given a suspension (a lesser form of excommunication) as a means of bringing her to court (Butler, 2006, p. 341).

These women left their husbands for a myriad of reasons, including bigamy, consanguinity, impotence, and general discontent, although the majority of the 121 cases sampled give no official reason for leaving (Butler, 2006, p. 345-6). The women who were ordered to return to their husbands did so having to promise to behave appropriately in future and obey their husbands or face punishment, which could include a fine or a public beating. Butler (2006, p. 344) notes that the ultimate judge of these women's behaviour was the husband they had originally left. Poignantly, although most cases do not raise the issue of abuse as a reason for leaving, several of these women requested that, as a term of their return, their husbands promised to treat them "in future well, decently, and favourably" (Butler, 2006, p. 346). Butler concludes that, in these cases, these women might have been trying to leave abusive relationships (*ibid.)*. Butler concludes by writing that:

> "Along with family and friends who chose to abet them, these women risked excommunication, imprisonment, public humiliation, weighty fines, and the threat of death to rebel against the permanence of marriage. The defiance of these women, and the willingness of others to assist, strongly suggests that, although the church regarded marriage as a binding contract between husband and wife, the English people were not as willing to embrace this point of view. This study of runaway wives helps us to refocus our social lens and achieve a clearer understanding of later medieval wives." (Butler, 2006, p. 352)

Studies like Farmer's and Butler's that explore social norms and the way people interacted with them can help to form a more complete understanding of how people lived their lives in the past, but, even more than that, how they actually *wanted* to live their lives. The following two studies,

however, will illustrate that, through a combination of both documentary and, in this example, bioarchaeological research it is possible to assess the direct impact socio-economic factors had on people's lives. Ideally, a study of quality of life should at least attempt to explore these aspects: what people said they did, what they did, and what they wanted to do.

Van Zanden (2005, p. 173) explored the claim that, although the GDP of countries in Europe and East Asia were vastly different in the 18th and 19th centuries, the standards of living for the individual were pretty much the same. In order to investigate this, van Zanden (2005) used a mixture of business and household accounts from 1450-1800 in the Netherlands to calculate the real wage for that time, figuring in wages, rents, food costs and other costs of living, to find out how much money people were actually earning. This research project's focus begins in the medieval period and could thus be used to compare living conditions in different parts of Europe during this time. It was found that, starting in the late medieval period and moving through to the modern period, wages decreased while rents and food prices rose. This offered a benefit to the rich, as they were paying their employees less, and was harmful to the poor and working classes as their rents and food bills went up while they were also being paid less (van Zanden, 2005, p. 181). This resulted in a low real wage, which lowers people's standard of living (and potentially quality of life) by reducing the choices available to a household (*ibid., p. 1*85). It could also suggest that, in relation to their later counterparts, workers in medieval Holland may have had more purchasing power and enjoyed a higher quality of life in this particular aspect.

van Zanden also refers to study published in 1982 by de Meere, however, which showed a decrease in average height from AD 1433 to 1860 (de Meere, 1982, cited in van Zanden, 2005, p. 185). This could be an indication that, although they may have had more purchasing power, their nutrition and health, at least during crucial growing years, may have been worse. van Zanden argues that, although the standard of living for the average person (as measured by real wage) decreased in the Netherlands from the medieval period, the GDP steadily increased. In this way, he argues, that while the GDP for countries in Europe and Asia during and before the Industrial Revolution were vastly different, the standard of living for the average person could well have been similar (van Zanden, 2005, p. 187). This is an example of the balancing of two kinds of data, economic and bioarchaeological, to produce ideas about people's changing quality of life. Specifically, van Zanden proposes the idea that, although health and nutrition was worse in the medieval period, this was balanced out by higher wages and stronger purchasing power. He is not arguing that people had comparable quality of life in all aspects of their lives, people from different times had different struggles and disadvantages, but their overall quality of life works out to be surprisingly similar (*ibid.)*.

As illustrated by van Zanden's work, when dealing with skeletal material, documents can provide valuable information about the quality of life of a population. In a survey (in association with the

Global History of Health Project) of an alms house cemetery population in Rochester, New York, the 296 individuals were found to rate very highly on the GHHP scale of quality of life (Higgins et al., 2002, p. 178). The population was a mix of individuals who had suffered prolonged illness, while others appeared to have died in relatively good health (Higgins et al., 2002, p. 163). Individuals buried in this mid-19th century cemetery were all people who had come to live at the alms house because they had nowhere else to go, were poor, and had illness or both (Higgins et al., 2002). The reason why some of the individuals were in apparently good health and had an overall very good quality of life can be explained by looking at the numerous records that survive from the alms house. The cause of death for the majority of the people buried there appears to have been sudden and due to an acute infection, something that leaves no trace on the skeleton (Higgins et al., 2002, p. 178). Many of these people had been healthy for the majority of their lives and had only come to the alms house to die. Others came to the alms house because they were so destitute that it was their only resort, they would have been nutritionally compromised in all likelihood and it is unsurprising that, once there, many contracted infections (*ibid.)*.

This argument could also be made for the monastic populations featured in this research. Many people, often members of the aristocracy, chose to retire to monasteries and nunneries, seeking peace, quiet, and religious observance in their remaining years (McNamara, 1996, p. 262-3; Hager, 1992, p. 393; Knowles, 1955, p. 229-30; Power, 1926, p. 25-6). Their presence in a monastic cemetery population could skew the archaeological data, as they may have enjoyed a privileged existence for much of their lives, eating well and often, leaving little trace of poor environmental conditions and diet on their skeletons, and having access to rare and costly objects, which could show up in the artefact assemblage, suggesting that the institution was wealthier than it really was. However, if enough wealthy individuals were present in a cemetery population to skew the data, it could be inferred that they were attracted to this particular institution because it offer them a quality of life similar enough to their own that they would not be uncomfortable in their retirement. This is not to argue that the monks and nuns of these particular institutions lived lives comparable to the aristocracy, but rather that their living conditions and diet were such that it would have been as much of a hardship as a duke or duchess retiring to a poor and deteriorating house.

2.2.5 Summary: A Range of Indicators for Quality of Life in Past Populations

There are a variety of materials available to study in order to gain an understanding of quality of life in past populations.

Archaeological data, specifically the exploration of artefacts, can be used to explore information relating to the wealth or status of an individual or group as well as an idea of some of the activities they were engaged in. This can help to shed light on a number of different facets that influence an individual or group's quality of life, including income, access to resources, diet, and even education.

Data associated with environmental archaeology can also inform on aspects of individual or group life that artefacts also describe, including their diet and access to resources, but can also be used to explore the living conditions.

Bioarchaeological data, similarly, can explore social differences, which are often influenced by income, education, and access to resources, diet, and the effects of poor living conditions. The opportunity to gain an insight in the life expectancy of particular groups is also an important aspect of bioarchaeological research. There are also those who believe it can be used to gather information on the activities of people in the past.

Documentary studies can use the personal views of individuals as well as limited census data to inform on all of these aspects, but can be very skewed towards the wealthier or higher status, often better educated, segments of a society.

The information available to researchers interested in quality of life in past populations can be used to investigate some of the influencing factors, including, but not limited to, income, diet, living conditions, education, access to resources, and the average life expectancy. These aspects of an individual or group's life can then be combined to form an idea of the differences in quality of life within a society or culture.

2.3 Envisaging the Medieval Understanding of Quality of Life

Religious writers and thinkers often wrote about the transient nature of the body in relation to the soul (Grudzen, 2007). In their view, the soul was all important and if a person needed to punish their body for their sins in order to reach Heaven, then that was a sacrifice well worth making (Synnott, 1993, p. 13). All in all, philosophical and theological writers that were both influential and accepted by the Church had a variety of opinions on what that true nature of the soul was and how it related to the body. These beliefs stemmed from one of two philosophical camps, loosely speaking, the Neoplatonic and the Aristotelian, which rose to prominence in the 13th century after Aristotle's *On the Soul* was translated into Latin (Ginther, 1998, p. 171-2). The Neoplatonic philosophy suggested that the body and soul were separate and that the body was the seat of corruption and needed to be curtailed and controlled at the very least (Ginther, 1998, p. 171-2). Neoplatonic beliefs were generally held up as monastic ideals. Aristotelians, on the other hand, believed that the body was the natural place for the soul to reside and that the union of the body and soul was an elemental part of being human. This philosophical argument gave support to the theological idea of the reunion of the body and soul in a glorified body that would occur at the Resurrection (Ginther, 1998, p. 171-2).

It is clear that the medieval belief structure in relation to the body/soul dichotomy was in no way straightforward. An individual's ideas about what the nature of the soul was and its relationship to the body would have depended a great deal not only on when a person was born, but on what texts they were reading (or had read to them). The medieval church was aware that many people in medieval society had no access to theological and philosophical texts, either due to low income or illiteracy, and so they relied on sermons, miracle plays, and wall paintings, as well as burial practices, to ensure that the larger theological ideas were transmitted to society at large (Gilchrist, 2012, p. 32). All of these ideas were considered to be acceptable by the Church in that they upheld the central tenets of the Christian faith without undermining the Church's authority. The immortality of the soul and the belief in the Christian Heaven and Hell (and Purgatory) were dogmatic, but the relationship the soul had to the body was a topic definitely up for discussion. Some believed that the soul merely controlled the body, others that the soul and the body were linked, still more that the soul was immortal and the body was only temporary, and what happened to the body was unimportant.

The body was viewed as a source of sin, the place from which temptation and corruption of the soul began (*ibid., p. 1*6). As such, an individual's sin could have physiological consequences, the most feared, of course, being leprosy. Leprosy, a disease far more common in medieval Europe than today, was often viewed as a physical manifestation of 'inner profanity,' the result of sexual promiscuity (Turner, 1996, p. 89). Secular writers often portrayed a more accepting and favourable view of the body as a source of pleasure (Synnott, 1993, p. 18). A popular type of story in the Later Middle Ages was the genre of courtly love and what was called 'the Art of Love.' These books and stories (conveyed often through song and troubadour culture) contain instructions on seduction and detailed but euphemistic accounts of eroticism (for a more full discussion see Jacquart and Thomasset, 1988, Chapter 3). One of the most famous and popular works was that of *De Amore*, written by Andreas Capellanus, a cleric himself (*ibid., p. 9*6-110). However, one would imagine that the monks and nuns being investigated in this study would have looked more to religious writings for spiritual guidance rather than erotic ones.

In the light of varying and competing attitudes to the body and soul it is unremarkable that, even between the religious writers, there was much debate about the respective roles of the body and the soul and how they impacted each other. St Francis of Assisi maintained that the physical body must be punished and subjected to heavy labour, writing that 'We must hate our bodies with [their] vices and sin' (quoted in Synnott, 1993, p. 16). Even *Piers Plowman* suggests that the body is not to be entirely trusted when it comes to temptation. Thomas Aquinas, however, wrote that the body and soul are one and that the individual, the self, comes from the combination of both, and that care had to be taken of both (Synnott, 1993, p. 17). Working under that assumption, the entire idea of quality of life is called into question. Where would these individuals have placed their spiritual or their physical wellbeing within their idea of a good quality of life? Would they have been happy to

suffer dietary deficiencies or infections as a way of testing and purifying their souls, or would they have wanted nothing more than to be functioning at an acceptable level of health, carrying out what they saw as God's work? Obviously, there is no way of knowing exactly how these individuals would have felt, because we cannot "survey" them. However, through careful examination of all the documentary and physical evidence surviving, a picture can start to be generated about their quality of life, and from there the discussion becomes divided into quality of life of the body and quality of life of the soul, in both theological and medical communities.

2.3.1 Inherited Philosophical and Religious Views: Body and Soul

Medieval ideas about the body, the soul and their relationship to each other are complicated enough to warrant a fully funded research project. In this section, a brief summation of some of the thoughts of the more influential thinkers on the matter will be given in order to assess what the monks and nuns being studied may have thought about the importance of their body in relation to their souls.

This is of particular importance when exploring the idea of quality of life as an individual who placed a greater importance on the quality of their soul over their bodily comforts could be viewed as having an extremely poor quality of life (i.e. putting themselves at health risk) when, actually, they believed that their quality of life was as high as humanly possible. For example, medieval ascetics purposely deprived their bodies of food and shelter, keeping themselves alive on the barest minimum requirements. An ascetic would rank very low on quality of life, as their early mortality rates would be high, as would a number of nutritionally influenced diseases and conditions. From their viewpoint, however, their soul would have been in the best state possible for attaining Heaven. Therefore, from their point of view, they would have had an incredibly high quality of life.

Would this have been the belief structure and the suggested living conditions of an average medieval monk or nun? That is what this section seeks to understand. In order to do this, a number of different kinds of source are examined. First, the medieval Church was more than happy to use pre-Christian or non-Christian philosophers' works, if they agreed with the dogma. A few individuals were particularly relied on, three of which are examined here: Plato, Porphyry and Aristotle. Secondly, various books of both the Old and New Testament in the Bible discuss ideas about the relationship between the body and soul. Those focused on here will be two books from the Old Testament, *Job* and *Proverbs*. The *Letters* of both Peter and Paul from the New Testament, as well as two of the four books that make up the Gospel, *Matthew* and *Luke*. Whilst the Vulgate is generally accepted as the closest to the versions of the Bible to which medieval religious would have had access, and many scholars use the Douai/Reims (e.g. 1853) version of the Vulgate, the King James translation was used in this research for pragmatic reasons.

The third set of works is those of the Church Fathers. The medieval Church had (and has) a group of writers and thinkers who are known as the Church Fathers, individuals who shaped the early Church. Again, there are a number of them, but only a handful are discussed here: St Augustine of Hippo, Origen (full name Origen Adamantius) and Saint Ambrose Bishop of Milan. The fourth group of texts examined is an assortment of religious writers who were influential during the medieval period and include Hildegard of Bingen, Peter Abelard, Thomas Aquinas, Bernard of Clairvaux, St Bonaventure and Anselm of Canterbury. The fifth and final set of works are those of important thinkers in the field of medieval medicine and include Galen, Hippocrates and Avicenna (Ibn Sina). Although none of them were Christian, their works were standard texts for medieval physicians. Clearly their viewpoint would have been vastly different with regard to the importance of the body. However, they were still influential thinkers and people may have considered their opinions when thinking about the importance of the relationship between the body and the soul.

Before discussing these groups of writers, however, it is important to note that not everyone medieval England would have had access to these texts, even in a monastic institution. The texts included in this section represent those that, while not necessarily widely available, were known to the Church. The acceptance or rejection of the ideas contained within these books made its way into the approved teachings of the Church or dogma. This does not imply that the general public or even the general monastic population kept fully abreast of the changes in the Church's dogma. Monastic houses were instrumental in preserving classical texts, as evidenced by the fact that these texts survive (Clark, 2011, p. 338).

(i) Greek Philosophers

Although none of the following three philosophers were Christians, two because of when they lived and the final because he disliked Christians, their texts were used throughout the Middle Ages. Religious scholars studied their writings, as illustrated by the fact that many classical texts have been identified in a number of monastic libraries, using them as a basis upon which to explore their own ideas about the way the world worked, the way to lead a good life and the relationship between the body and the soul (Clark, 2011, p. 337-8).

Plato, who lived between 428/7 and 348/7 BC, wrote that the soul was immortal, although he suggested a kind of reincarnation as an explanation for what happens after death (Plato, 1957a, p. 380). He believed that the body could not survive without a soul, i.e. at death (Plato, 1997, p. 56). Although he wrote that it was necessary to take care of one's body, the soul or mind should be the focus of the philosopher (Plato, 1997, p. 56). Plato also wrote that 'the soul cannot properly concentrate on philosophy when the body is preoccupied with nurturing itself' and that the soul is more able to be happy when it had rid itself of the body's 'confusion, ignorance, fear, violent desires and the other human ills' (Plato, 1997, p. 71). This idea that the soul is happier without the body would become central to the medieval Church's doctrine. Another idea popular with the

Church was also influenced by Plato, that of the idea that impure souls, souls of people who had done wrong or been too indulgent, would be punished after death, while the souls of philosophers and good people would not be punished (Plato, 1997, p. 71). Plato did not specify that the souls of philosophers and good people would be in a place of eternal reward, but it was not so far a leap that Christian writers could not use Plato to illustrate and support their ideas.

Another philosopher who was influential after his time was Aristotle, who lived between 384 and 322 BC (Ginther, 1998, p. 15). His ideas on the nature of the soul were popular, most notably by Thomas Aquinas who would base his ideas on the nature of the soul on Aristotle nearly a thousand years after the philosopher was alive (Ginther, 1998, p. 175). Aristotle wrote that the soul is the actuality or form of the body, that if the body was a ball of wax the soul would be the imprint made on it (Aristotle, 1986, p. 157). An easier metaphor is that if the body were an eye, sight would be the soul; just as the pupil and sight are equivalent to the eye, so the body and soul are the person (Aristotle, 1986, p. 158). He also wrote that the difference between being alive and being dead is the presence of the soul, meaning that once dead the soul leaves the body (Aristotle, 1986, p. 159). The soul is also, according to Aristotle, what people perceive and think with; the soul is the person at the most basic level (Aristotle, 1986, p. 161). These ideas were prevalent, although gave no indication as to which was more important, the body or the soul.

Porphyry, who lived between AD 234 and 305, was also an influential force on the medieval Church. He did not specify which was more important, either the body or the soul. He did, however, write about the weakness of the body in relation to the soul, suggesting that the body always wants to submit to temptation and that a person's soul must strive against said temptation (Porphyry, 1999, 1.43.1-2). In his treatise *On Abstinence from Killing Animals*, Porphyry claims that a moral person should refrain from all temptations, including eating meat (Porphyry, 1999, 1.44.1-3, 1.45.1-2). He argued that the reason it was wrong to eat animals is that, unlike people, animals' souls are mortal and so when they die, rather than rejoicing in freedom from the body, they are simply dead (Porphyry, 1999, 1.19.2-3). The idea that the souls of people live on after death echoed the central doctrine of Christianity. Another popular idea of Porphyry was that if the body is 'fattened it starves the soul of blessed life and enlarges the mortal part, distracting and obstructing the soul on its way to immortal life' (Porphyry, 1999, 4.20.10). He also wrote that sex is a polluting action on the body and the soul and that the most ideal existence is one in which the body does not require feeding or watering and the soul can focus on God (Porphyry, 1999, 4.20.2-3, 4.20.15).

Although not Christians, the writings of these three philosophers agreed with and provided a basis upon which theological studies of the Christian ideas were founded. All three write about the importance of the soul, two directly state that more focus and attention should be paid to the soul. The monks of the medieval period, and perhaps some nuns would have been familiar with these

works, as they were part of the basis of what is often called a classical education, the prevailing type of education in the medieval world, being defined as the study of the three arts, grammar, rhetoric and dialectic (Greatrex, 2000, p. 44). These works certainly influenced medieval theologians on their ideas regarding the relationship between the body and the soul, but were also read as stand alone works and so may have had an influence on individuals' ideas about the nature of this relationship.

(ii) Bible

One of the primary texts used in the religious lives of both monks and nuns would have been, of course, their own religious text, the Bible or, at the very least, devotional texts based on the books of the Bible (Erler, 2007). Two books in the Old Testament have references in them to ideas about the relationship between the body and the soul. Following this, in the New Testament, a collection of letters written by the apostles Peter and Paul discuss the issue. Finally two of the Gospels, Matthew and Luke, deliver what were believed to have been the actual sayings of Jesus on the matter.

In the *Book of Proverbs*, in the Old Testament, chapter 23 suggests that the soul is more important than the body when the writer suggests that punishing a child for their sins will keep them out of Hell. 'Withhold not correction from the child; for if thou beatest him with the rod, he shall not die. Thou shalt beat him [your son] with a rod, and shall deliver his soul from Hell' (Prov. 23:13-14). *Proverbs* is believed to have been written over a long period of time, being finalised some time in the 5th century BC. It is a collection of 'short sayings expressing in pithy form insights into human affairs, especially of a social and religious nature' (Metzger and Coogan, 1993, p. 624). The section in which the above verse is found reads like a series of instructions and warnings on morality (Metzger and Coogan, 1993, p. 625). From the verses above, people would have understood that it is necessary to punish wrongdoing, physically or using some other penance, to atone for one's sins and achieve redemption.

The *Book of Job* also suggests that if one suffers, one will be rewarded. In it Job is a pious and upright man with a large happy family and considerable estates. He lives well (Job 1:1-8). Satan suggests to God that Job is only good and pious because he is so blessed. God destroys Job's property and livelihood and kills his children (Job 1:9-19) but, even so, Job continues to praise God and live a pious life (Job 1:21). Satan approached God again, saying that Job is only doing this because he still has his health (Job 2:4-5). God gives Satan free license to do what ever he wants to Job as long as he does not kill him (Job 2:6). Job suffers illness and constant pain, but when Job's friends visit his house, they find him still faithful. They argue about religion, Satan putting cruel words in the mouths of his friends, but still Job is pious (Job 2-37). In the end, as a reward, God gives Job twice the wealth and privilege he had before his ordeal began (Job 42). The story of Job advocates faith in the face of any and all trouble and heartache. After he suffers so much, Job is

rewarded. This message, that suffering will equal reward in the end, echoes both the ideas in *Proverbs* and also those of Porphyry. It became a central message to the medieval Church.

In three of Paul's letters, similar statements are made about the need to mortify or subjugate one's body to save the soul. In his letter to the *Romans*, Paul writes about the inherently sinful nature of the body and the soul living on after death (Rom 6:11). He holds that if a person lives for their body and not their soul, they will go to Hell, as will anyone who lets sin 'reign' in the body (Rom 6:12, 7:18). It is in *Romans* that Paul makes the claim that if a person mortifies the 'deeds' of the body, their soul will be saved, 'for if ye live after the flesh, ye shall die: but if ye through the Spirit do mortify the deeds of the body, ye shall live' (Rom 8:13). In his first letter to the *Corinthians*, Paul echoes Plato, claiming that there is a natural body and a spiritual body and that only the spiritual body (the soul) lives on (Cor I 15:44-50). He writes about the need to control or subjugate the body for the sake of the soul, 'I keep my body, and bring it into subjection' (Cor I 9:27). It is in Paul's letter to the *Galatians* that the importance of the soul over the body is made explicit, and he writes that it is 'better to walk with the Spirit than the flesh' (Gal 5:16). The body, according to Paul, is all about sin, while the soul is about virtues, which Paul lists as love, peace, gentleness, goodness, faith, meekness and temperance (Gal 5:19-23). 'For he that soweth to his flesh shall of the flesh reap corruption, but he that soweth to the Spirit shall of the Spirit reap life everlasting' (Gal 6:8). In short, if a person focuses on their body they will go to Hell, but if they focus on their soul they will go to Heaven.

The disciple and apostle Peter is less direct, and he writes that if a person suffers in their flesh, as Christ did, they will have erased their sin (*First Epistle of Peter*). '...for he that hath suffered in the flesh hath ceased from sin' (Peter I 4:1). Peter also writes that suffering for one's faith is nothing to be ashamed of, because it glorifies God and echoes the suffering of Christ (Peter I 4:13 and 16).

Both Peter and Paul were writing at a time when many Christians were still being persecuted for their faith; their writings gave people pride and conviction in their persecution. The message, however, remained long after Christianity was the dominant religion in Europe and people were no longer practicing it in secret.

Similar reassurances are to be found in the Gospels. *Matthew* relates the story of Jesus in which he told people that the body is not as important as the soul. 'Take no thought for your life, what ye shall eat, or what ye shall drink; nor yet for your body, what ye shall put on. Is not the life more than meat, and the body than raiment?...And fear not them which kill the body, but are not able to kill the soul' (Matt 6:25 and 10:28). The same story is told in *Luke*, although the wording is slightly different; 'Take no thought for your life, what ye shall eat; neither for the body, what ye shall put on. The life is more than the meat and the body is more than raiment...And seek not ye what ye shall eat, or what ye shall drink, neither be ye of doubtful mind' (Luke 12:22-23, 29). Therefore, in

addition to the message that the body is less important than the soul, the quote in *Luke* includes a quick message on the importance of faith.

The books of the Bible, therefore, echo many of the writings of the Greek philosophers. In addition to the message that the soul is more important than the body, however, there is the additional idea that not only is bodily suffering not a bad thing, it could actually be good for the soul.

(iii) Church Fathers

Writers who were deemed to be influential in the foundation of the doctrine of the early Church were (and are) known as the Church Fathers. Three of the individuals are discussed below: Origen, St Augustine of Hippo and Ambrose, and the Bishop of Milan. All three lived before AD 500 and wrote about the nature of the relationship between the body and the soul.

According to Origen, who lived between 184/5 to 253/4, the soul is bound to the body as a punishment from God for the sins committed during the Fall, the fight between Lucifer and God (Origen, 1936, p. 67). The body itself is mortal, corruptible and full of lust (Origen, 1936, p. 85 and 147). It must be punished in order for the soul to be purified and thus re-attain Heaven: 'when the body is punished the soul is gradually purified, and so is restored to its ancient rank' (Origen, 1936, p. 146).

Many theologians struggled with the idea that, after the Resurrection, the soul and the body would be reunited. So many of them wrote about the mortal and corruptible nature of the body that they had to stipulate that the body, reunited with the soul, would be somehow different from the actual earthly bodies. Both Origen and St Augustine, discussed below, wrote that the body received after the Resurrection would be the natural body that had been transformed into something that was incorruptible and immortal (Origen, 1936, p. 252; Augustine, 1997, p. 16).

Augustine of Hippo, who lived between 354 and 430 AD, agreed with Origen that the body was corruptible and that those who punished their bodies were trying to make it obey the mind and the soul (Augustine, 1997, p. 19). He wrote, however, that a person should love their body, because it was made by God. The body must come after both God and a person's own soul (Augustine, 1997, p. 18). According to Augustine, the mind/soul are being constantly tormented because they both love the body but are dragged down by its corruptible nature (Augustine, 1997, p. 18).

This is similar to Ambrose's idea that the body distracts the soul from focusing on Heaven (Ambrose, 1996, p. 38). He likened the body and soul to a chariot being pulled by unruly horses. Without a skilled driver, which Ambrose writes is the Word of God, the horses will tear the chariot apart (Ambrose, 1996, p. 42-3). Ambrose lived between 339 and 397 AD, attaining the rank of bishop in 375 (McLynn, 1994). He wrote that the soul gives life to the body and rules it, but that it

will be dragged down into corruption without the help of God (Ambrose et al., 1972, p. 13-4). He echoed Paul's sentiment that 'those who are in the flesh are absent from the Kingdom of God,' meaning that those who focus on the body will go to Hell (Ambrose et al., 1972, p. 38).

These three theologians and authors were unshaken in their belief that the soul was more important than the body and that the body needed to be punished and brought into submission if the soul was going to get to Heaven. The medieval Church rallied behind these ideas, making them central to its early dogma.

(iv) Religious Writers

Later Theologians built on these ideas, writing about the finer details and exploring the minutiae of each word and phrase. Many written works in the later medieval period were considered dangerous by the Church, which occasionally resulted in the author being excommunicated or at least threatened with it. Some of the following authors wrote works that were considered questionable by the Church, and therefore only those writings deemed acceptable by the Church have been included.

Two monks, living in the 11th and early 12th centuries, were apparently concerned about what exactly qualifies as a sin. Both Anselm of Canterbury, 1022-1109 AD, and Peter Abelard, 1079-1142 AD, wrote about the role of will in the actual act of sinning, believing that it is not the action that makes a sin, but the will to perform that action. According to Anselm, a person cannot sin without will, even when being tempted, writing that 'he cannot will unwillingly, because one cannot will to will against his will' (Anselm, 2008, p. 181). He explains, saying that a horse eats because it is hungry, because it is in the horse's nature to do so. Man, however, is not subject to nature and only eats because he wills it so (Anselm, 2008, p. 183). Although it is difficult to resist temptation, it is not impossible; therefore it is a matter of will (Anselm, 2008, p. 184). Abelard also writes that temptation alone is not sin, but rather the consent to give in is the sin (Abelard, 1995, p. 7). The soul is constantly under temptation, because the structure of the body is wanton and corrupted, weighing down the soul (Abelard, 1995, p. 2, 103 and 134). He goes on to write that it is only through 'taming the flesh' that people can be virtuous and that moderation is the key to holding off temptation (Abelard, 1995, p. 1 and 100).

Bernard of Clairvaux (1090-1153 AD), a Cistercian monk and religious celebrity of the 12th century, wrote that all temptations must be avoided, including paying excessive attention to one's health (Bernard of Clairvaux, 1971-80, p. 121). His theory was that a person could either walk with the flesh or with Christ, and not both (Bernard of Clairvaux, 1971-80, p. 120). The body, according to Bernard, was a sensual and carnal thing, and it had a 'sinful lineage' that meant that a person was never without sin (Bernard of Clairvaux, 1971-80, p. 119 and 90). Even so, the body did not stand in the way of personal Salvation, the act of sinning does (Bernard of Clairvaux, 1971-80, p.

90). Bernard wrote that it would be better to have never been born than to give in to the temptations of the flesh (Bernard of Clairvaux, 1971-80, p. 161).

His beliefs echoed those of the philosophers and early theologians, that the soul gave the body life and that the body had none of its own (Bernard of Clairvaux, 1971-80, p. 159). The body, as with Origen, was necessary in order to achieve 'everlasting life,' for without it a person could not act for the benefit of itself or others and thereby do the good works required to save one's soul (Bernard of Clairvaux, 1971-80, p. 25).

Hildegard of Bingen, (1098-1179), also wrote that a person must chose between the body and the soul and that to chose the body meant eternal damnation (Hildegard, 1997, p. 105). If a person were to choose their body over their soul, they will be tormented in Hell (Hildegard, 2001, p. 27; Hildegard, 1997, p. 207-8). In life, too, if people suffer willingly, their sins will be washed away. This physical punishment, Hildegard warns, must be carried out under the instruction of a priest (Hildegard, 2001, p. 60). This idea, though often cited as being a common belief in the medieval period, is not found in all religious writings on the subject of penance.

According the Bonaventure (1221-1274), the body was originally obedient to the soul and did not require the subjugation and punishments advocated above to keep it in line (Bonaventure, 1947, p. 71). However, when Adam and Eve ate the apple and were expelled from Eden, the carnal nature of the body gained 'precedence' over the soul (Bonaventure, 1947, p. 110). Even so, Bonaventure, unlike the preceding theologians, and reminiscent of the Greek philosophers, wrote that people must love their bodies because they were created by God (Bonaventure, 1947, p. 164-5).

The body, however, comes last in the list of four things that people must love (Bonaventure, 1947, p. 164-5). The first thing is God, followed by life or the soul, followed by mankind as a whole (*ibid.)*. Bonaventure refers to these as a different aspects of the idea of 'good'; God is the supreme good, the soul is the intrinsic good, your neighbour is the cognate good (similar to, but slightly apart from the intrinsic good) and finally the body is the subjected good (Bonaventure, 1947, p. 165). Although the body comes last and clearly needs to be controlled, Bonaventure still advocates loving it and taking care of it.

The final theologian discussed here will be Thomas Aquinas (1225-1274). His work explored the theoretical nature of the soul, including its relation to the body. As with the other theologians cited here, he believed that 'Human flesh cannot be virtuously good in itself, but under the command of reason it becomes a tool of virtuous activity...there are no virtues in the body but only in the soul' (Aquinas, 1993, p. 405). This echoes the idea held by both Origen and Bernard of Clairvaux that the body is necessary because it can do good works, but that it must be controlled. Aquinas wrote that the soul is separated from the body in death and that it can subsist on its own (Aquinas, 1993,

p. 189-92). He believed, however, that this was against nature and that both would have an incomplete existence until the Resurrection when they would be reunited (Aquinas, 1993, p. 192). The soul, according to Aquinas, is what gave the body form, like Aristotle, as well as life and intellectual understanding (Aquinas, 1993, p. 128).

The theologians in the Later Middle Ages appear to have agreed that the body was both mortal and corruptible. They further agreed that the soul was immortal and had a higher nature than the body. Most believed that the body needed to be controlled or subjugated, although some thought that this action of control, in combination with other good works, is what purified the soul so that it could reach Heaven. The idea that the body and soul would be reunited at the Resurrection appears to have been a common one, although most wrote that the body would somehow be transformed into something worthy and more holy than its living incarnation. They believed that the soul was where the focus and attention of an individual should be and that those who focused on the body were damned to Hell.

(v) Medical Writers

The physicians, whose 'business' concerned the body, one would imagine, had a different outlook. That being said, medieval medical care often combined both physical and spiritual treatments (Ziegler, 2001, p. 4; Rawcliffe, 1998, p. 62). This next section will explore the writings of influential medical writers for their views on the relationship between the body and the soul.

Hippocrates, arguably the best-known medical writer of the ancient world, lived between 460 and 370 BC. The focus of most of his work, understandably, is treatment of various ailments of the body. He does discuss, briefly, the nature of the soul when discussing the health problems associated with people originating from different climates (Hippocrates, 1969). His argument is that the differences in body type and "race" reflect the differences found in the spirit or soul which are shaped by the climate in which people are born (Hippocrates, 1969, p. 153-4). For example, he suggests that people of Arabic descent are lazy because of the uniformity of their climate (Hippocrates, 1969, p. 153-4). People living in low lying areas with 'sultry meadows' will have bodies that are large, regular, broad and fleshy with black hair and skin, according to Hippocrates (Hippocrates, 1969, p. 156). They will be phlegmatic, meaning calm and self-assured. Hippocrates also writes that these people will be neither energetic nor patient (Hippocrates, 1969, p. 156). In short, Hippocrates argues that the environment in which they are born heavily influences the soul and the body, equating bodily differences with differences in a person's soul or culture. He does not discuss whether the soul lives on after death, preferring to describe differences he sees in living people and assign them causes and/or cures.

Galen of Pergamon, living between AD 129-199/217, also focused on the body over the soul, saying little to nothing of the nature of the soul or its influence on, or relationship with, the body.

In his treatise *On Natural Faculties*, Galen mentions that some requirements and conditions, and therefore treatments, will vary depending on the 'nature' of a person or their soul (Galen, 1928, p. 45). Other than that, Galen seems little interested in how, exactly, people are alive and what happens to them after death, but more in keeping them alive.

Avicenna (or Ibn Sina), a Muslim scholar and physician who lived between 980 and 1087 AD, wrote that 'whole corporeal nature is subject to the soul' (Avicenna, 1930, p. 110). As with the other two physicians, Avicenna's primary focus was on the body and therefore he writes little about the soul. He mentions the soul only in his belief that the soul perceives through the senses and operations the body (*ibid.)*. The further nature of the soul, how it works and what happens to it after death, does not seem to have concerned him.

Overall, the physicians most influential in the medieval period appear to have acknowledged the existence of the soul and its role in perception and life, but cared very little about its nature. They did not explicitly write whether the body or the soul were more important, but their focus was on the health and wellbeing of the body. The overall message coming out of the medical profession appears not to be one of competition but rather concluding that the health of the body and the health of the soul were interconnected, but that the practicalities of that relationship was unknowable (Ziegler, 2001, p. 6).

All three of these authors would have been known to any monks, canons, or friars studying medicine at Oxford, Cambridge, or one of the European universities, as they were not uncommon texts (French, 2003; Ziegler, 2001; Rawcliffe, 1998). It is doubtful that the average person would be aware of these texts, but if they were to seek treatment at a monastic hospital any monk-physician trained at any of these universities would be aware of the ideas in these texts and their treatment would, presumably, be influenced by the ideas within them. Another way these ideas could have been transmitted to those who did not study medicine at a university it through images and writings, if they were literate, within a hospital itself.

Within the statutes of the Savoy Hospital, for example, founded in London in 1505 (VCH, 1909, p. 546), the message is clear, the soul is more important than the body, even within a medical institution:

> Whereas sickness takes two forms - namely of the body and of the soul - it is necessary that each should be provided with health-giving medicines. And these should be principally for the health of the soul which is more honourable, more dignified and more excellent than the body.'
>
> (quoted in Rawcliffe, 1998, p. 48)

Medieval hospitals, not including alms houses or leprosaria, were primarily places where the sick poor where taken. People with money were able to hire a nurse to care for them (Rawcliffe, 1998),

and nurses were expected to care for and comfort a patient, but not to medically cure them. They were referred to as priests for the body; the body, being less important than the soul, could be the responsibility of women (Rawcliffe, 1998, p. 49). Hospitals were mostly religious organisations, with masses being conducted throughout the day (Rawcliffe, 1998, p. 62; Gilchrist, 1994, p. 116). It was thought that the religious music along with being able to see (or at least be aware of) the consecration of the host would provide comfort and healing (*ibid.)*. One hospital in Oxford, St John the Baptist, had an area thought to have been an immersion tank (for lack of a better word) for use in baptisms as a healing ritual (Gilchrist, 1994, p. 112). However, the majority of medical care took place within the home, rather than within hospitals. An injured or sick person would call upon a surgeon, barber, bonesetter or herbalist to diagnose and treat them. These occupations were associated with lay rather than religious people and therefore not associated with the, primarily, monastic hospitals where physicians, having been trained at universities and taken holy orders, would diagnose and recommend treatments (French, 2003, p. 120; Rawcliffe, 1997, p. 112). It fell to nurse to carry out the majority of these treatments (Rawcliffe, 1998). Most hospitals had medicinal gardens with the nurses often being in charge of the management of the garden as well as the blending and prescribing of the poultices and remedies (Rawcliffe, 1998, p. 58-59).

Disease was widely thought to be the result of an imbalance of the four humours, brought on by incorrect diet or behaviour (French, 2003, p. 121; Rawcliffe, 1997, p. 33-42). It could be combated or prevented by a diet intended to keep the humours in balance, the release (bloodletting, vomiting, menstruation) of an excessive build up of one or more of the humours, and exercise intended on keeping all the body's systems working properly, i.e. keeping the humours in balance (*ibid.)*. The treatments administered by these lay people can appear remarkably similar to modern treatments, as with the reduction of swelling by elevation before the setting of a fractured bones, or less so, as with prescribing the application of burnt hair of a 'true maiden' to an area to reduce swelling (Van Arsdale, 2002, p. 109.2; Peltier, 1990, p. 27). Diseases were also believed to be the result of God's will or an excessive or sinful lifestyle (French, 2003, p. 121; Rawcliffe, 1997, p. 41-2). Physicians were employed to prevent diseases, by prescribing a proper diet, exercise and bloodletting at appropriate times in the year (French, 2003, p. 121; Rawcliffe, 1997, p. 41-2). They were only expected to give the agreed treatment (and often prayer) for any given disease, but the success of the treatment and prayer was reliant on God (*ibid.)*.

As for the message transmitted to the average person by the great philosophical, theological and medical writers on the matter of the relationship between the body and the soul, the state of the soul was seen as far more important than the state of the body. The Church and the universities held that medicine was subordinate to philosophy and that it was not the remit of physicians (much less surgeons, barbers, and apothecaries) to question its conclusions (French, 2003, p. 81). It is interesting to note that English universities required their students wishing to study medicine to first complete the standard arts degree, in which they would learn rhetoric and philosophy, meaning

that university trained physicians would be taught fully philosophical and theological theories about the soul before moving on to their training regarding the body (French, 2003, p. 84; Rawcliffe, 1997, p. 25).

How much these ideas would have impacted what medieval monks and nuns actually thought about their own quality of life is unknowable However, the distinct possibility, indeed likelihood, that the health of their soul mattered more to them than the health of their body must be taken into consideration when comparing the two.

2.3.2 Quality of Life and Medieval Notions of Gender and Sex

In examining medieval ideas about quality of life, one reads about the importance of balancing the body's humours, controlling baser urges and a variety of advice about the care of the body and soul (the dichotomy between these two is discussed below). Much of this advice, however, comes in two forms: one for men and one for women. Medieval views about men and women were often disparate, men being viewed as strong, women as weak, men in charge, women subordinate, men hot, women cold, etc. (Cadden, 1993, p. 163). Many of these views were brought together from a myriad of different cultures, specifically Judaic religious and legal beliefs, and Greek and Roman cultural views (Brown, 1988, p. 17-20). As one of the main questions of this study is the difference in quality of life between male and female religious houses, it is important to examine these views and their social value. Within the church building, there are some writers who argued that women should be segregated to the north and west of the building (Gilchrist, 2012, p. 173). This could have prevented or at the very least impeded their view of the Elevation of the Host, the most central element in medieval religious ceremony (believed to produce the greatest spiritual salvific and physical healing effect). This would have drawn a firm line between men and women and may have reinforced certain beliefs about the differences between the two.

Before a full discussion of the social views of men and women, however, a distinction must be drawn between the two terms, sex and gender. The World Health Organisation defines sex as 'the biological and physiological characteristics that define men and women,' and gender as 'the socially constructed roles, behaviours, activities, and attributes that a given society considers appropriate for men and women' (http://www.who.int/gender/whatisgender/en/ 6 June 2011). It can be a difficult concept, especially for people who have never considered the two as potentially separate. An illustrative example is often best. For example, women have vaginas, this is an aspect of their sex; in the western world, women wear dresses, this is a feature of their gender. Other features of the feminine (western) gender is that they are considered to be more caring and therefore better caregivers, leaving women responsible for childrearing.

Many archaeologists, bioarchaeologists and historians have been calling for the two terms to no longer be used as synonyms and for research to investigate different views on gender in past

societies (Geller, 2008; Geller, 2009; Roberts and Manchester, 2005, p. 31; Walker and Cook, 1998). Walker and Cook (1998), notably, began the discussion by pointing out that, while those studying culture and those studying biology speak of either gender or sex, bioarchaeologists, who attempt to bring the two fields together, are guilty of using the two works interchangeably. By not investigating the ways in which other societies may have viewed the social responsibilities of men and women, interpretations are left that men hunt and women gather, or men do the interesting things and women stay home with the children (Geller, 2008). This is known as the western folk tradition which tends to interpret al.l cultures with a strict division of labour and two genders, clearly regimented with biological sex (*ibid.)*.

When confronted with cultures that have a third or even fourth gender, these are viewed as anomalies, and not taken into consideration when investigating other cultures (*ibid.)*. An example of where this hampers research is that of the Chinchorro in northern Chile (Geller, 2008, p. 122-3). A large number of skeletons from this site were found to have lesions typical of damage sustained from diving in deep cold water over a long period of time (Standen et al., 1997). It was found that the majority of these were male (46.9%), leading the researchers to conclude that men were responsible for hunting/fishing. However, as, 20% of the individuals with this condition were female and a comparative, modern culture showed that women were also responsible for fishing, it is difficult to understand why strict sexual division of labour was concluded (Standen et al., 1997, p. 127). However, there were several skeleton with this characteristic damage that were sexed as female, but no discussion was given as to the potential implications this might have on the sexual division of labour in this society (Geller, 2008, p. 123).

This is not only a problem for historians and archaeologists, modern medical research often fails to take into account the impact sex and gender might have on the treatment and presentation of a disease. Current medical research has begun, over the past 30-40 years, to investigate how sex and gender influence and impact on people's quality of life; although many people argue that more still needs to be done (Tosi et al., 2005; Krieger, 2003; Bird and Rieker, 1999). In her examination of the impact of the sex and gender on health, Krieger uses twelve examples of how gender and sex can impact both the exposure an individual has to a disease or condition, but also how they may impact the outcome of it. In the case of the transmission of HIV/AIDS via hypodermic needle, Krieger found that women, by the 'gender segregation of the workforce' (women are more likely to be nurses), had a higher risk of exposure, but that their biology (i.e. sex) did not affect their exposure or outcome (Krieger, 2003, p. 654). However in the case of sexually transmitted HIV/AIDS (between heterosexual men and women), she found that women were also at a higher risk of exposure, both in gender ('gender power imbalance…to negotiate condom use') and sex ('greater biological efficiency of male-to-female…transmission') (*ibid., p. 6*55).

Another example of a gender bias in the outcome of treatment comes from a bias in the selection of test subjects for medical drugs and treatment testing. Following the thalidomide disaster in the US in the 1950s and 60s, pregnant and potentially pregnant women were barred from becoming test subjects. This resulted in the exclusion of virtually all women from medical tests (Tosi et al., 2005, p. 1642; Bird and Rieker, 1999, p. 747). It was not until the 1980s that women were *allowed* to be included in these tests. However, following this ruling, many drug companies did not wish to include women because their hormone fluctuations often affected the results. Once past testing, though, women were still prescribed these drugs, even though little was known about how they would affect their bodies. The Food and Drug Administration (FDA) finally *required* women to be included in drug testing in 1998 (Tosi et al., 2005, p. 1642-3). Women were being ignored by medical testing because a) it was assumed that their bodies were just like 'little men' and b) because their bodies were not like men's, a perfect example of discrimination biased on both the female sex (by virtue of their hormonal fluctuations) and the feminine gender (by the assumption that there was not really a difference between men and women).

These are some examples of modern quality of life being affected by assumptions and realities about both sex and gender. In the medieval world, the medical and philosophical communities often theorised about the differences between men and women. Both sexes were still seen as the same type of being, one made in God's image. Men, of course, were viewed as the superior manifestation and women were the secondary creation, inferior, sometimes monstrous or deformed, manifestation (Cadden, 1993, p. 163; Jacquart and Thomasset, 1998). This idea, of women's weakness and inferiority, extended into the realm of morality, with women being thought of as morally weak with an inherently lustful nature (Cadden, 1993, p. 163). The relationship between the two, however, can best be described as a spectrum, with men on one side and women on the other (Murray, 2008, p. 39). However, medieval writers recognised that some individuals did not fall into one group or the other and they included at the midpoint all those who were 'morally suspect' as well as those who were 'biologically ambiguous,' meaning 'unmen' or slaves, eunuchs, homosexuals and transvestites (Murray, 2008, p. 48). In other words, individuals who were biologically male, for example, but identified themselves with feminine characteristics (i.e. by dress or sexual preference) were set aside from other men. It could be argued that there was a difference in the medieval mind between sex and gender.

This, however, brings up an interesting question, once socially normative positions are given up, i.e. when someone rejects the reproductive side of life, can they still be considered as masculine or feminine? Some research suggests that those outside what modern Western people would call 'heteronormative positions' fall into a third gender, recognized and defined by medieval medicine and philosophy (Murray, 2008, p. 35; Gilchrist, 1997, p. 43). These are not individuals who were considered 'monstrous,' as hermaphrodites were often called, but rather elected to leave behind gender norms for religious reasons, and to become priests, monks, and nuns. Once outside

explicitly laid out gender norms, the rules changed. An example of this would be an abbess. As a woman, she would have been legally barred from owning land, holding council/political positions, and other things (Sharar, 2003, p. 11). As an abbess, however, she would have controlled land, tithes, taxes, people etc. she would have been barred from if she had lived within the rules of normal society. Other women, often widows of merchants, were also allowed to run their husband's business, although only in the absence of a male heir (Gilchrist, 2012, p. 129). These women, however, were the exception, rather than the rule. Women were generally considered to be morally and physically weak, unable to cope with the difficult business of running a business or a country (Sharar, 2003, p. 12; Cadden, 1993, p. 163).

Many of these beliefs can be traced back to the story of Adam and Eve in the Bible. Eve was the one who gave into temptation and led Adam astray, leading directly to the Fall – the event that condemned all humanity thereafter to be born with the taint of this original sin (with the exception of the Virgin Mary). Similar stories of female weakness leading to male loss of status, wealth or life can be found throughout the Bible and are frequently referred to in medieval theological writings and sermons (Peters, 2003, p. 133). These ideas were not simply religious, but extended into the medical tradition, and affected people's standard of living. Bynum points out that, in recipe books, it was suggested that women should avoid all heavy foods, especially meat as it was 'seen as a aggravator of lust' (Bynum, 1987, p. 191). Needless to say, any woman prone to anaemia following this advice would have experienced a considerable effect on of her quality of life.

Bynum goes on to highlight the importance of food in female piety in the medieval period, suggesting that it was more important to women than men (Bynum, 1987, p. 4). In their study of 864 hagiographic accounts, Weinstein and Bell found that more female saints' lives have elements of starvation or fasting than men (cited in Bynum, 1987, p. 76). Women were also more likely to practice other forms of extreme asceticism including not seeking medical help for a chronic (and potentially painful) illness, wearing hair shirts and girdles, or whipping themselves. Some even went so far as to disfigure themselves to avoid an unwanted marriage (*ibid., p. 2*34-5). Medieval stories about generosity and charity show men giving away money, while women give away food. Bynum argues this is because food was the only resource to which women controlled access (Bynum, 1987, p. 191). She states that 'since late medieval spirituality valued both renunciation and service, each gender renounced and distributed what it most effectively controlled: men gave up money, property, and progeny; women gave up food' (Bynum, 1987, p. 193)

Many popular diagnoses of medieval religious women and girls giving up food involve the eating disorder *anorexia nervosa.* They are thought to have given up food both as a method of control, i.e. engaging in a test of wills between themselves and the Church patriarchy, as well as fully realising the medieval ideal of self-denial (Bell, 1985). Bynum agrees, suggesting that religious women sacrificed the only thing they were able to control in an effort to fulfil their charitable calling, but

also to be closer to God (Bynum, 1987, p. 191-3). In this way, they would have been putting themselves at extreme health risks, some of which may leave a record on the skeleton.

Studies on individuals who have undergone semi-starvation, the most well known being the Keys' University of Minnesota Starvation study carried out in 1944, have shown that the damage done to an individual is both physiological and mental (Kalm and Semba, 2005; Keys, 1950). In his study of 36 conscientious objectors who volunteered to undergo a period of semi-starvation, Keys found that the men suffered changes in blood pressure, cholesterol levels, and heart rate at a time when these were thought to be fixed (Kalm and Semba, 2005, p. 1347; Keys, 1950). He also found that many suffered changes in personality (*ibid.)*.

Studies on patients with anorexia today have found a high correlation between extreme weight loss and a number of health problems, including osteopenia, anaemia, low heart rate (as low as 40 bpm) and blood pressure, low platelet count, hypothermia, abnormally low numbers of bone marrow cells, dental caries and enamel hypoplasia (Misra et al., 2004, p. 1575-9; Mitchell, 1986, p. 249). Some studies have also suggested higher rates of infection among *anorexia nervosa* sufferers (Misra et al., 2004, p. 1580). In 2004, *anorexia nervosa* had the highest mortality rate of any psychological illness at 5.6%, the majority of the deaths the result of suicide or cardiovascular problems (*ibid., p. 1*575). As deadly as this condition is in the modern world, it would have been much worse in the medieval period, especially if the sufferers were not medically treated in any way, but rather lauded for their actions. Male saints, however, are characterised by their power, rather than their renunciation. In their survey, Weinstein and Bell (1982, p. 237) found that male saints' lives were typified by their holding of temporal or ecclesiastical power, being a preacher, a 'champion of public morality,' or a 'defender' of virtue. This is thought to be a reflection of the society in which they lived, where men were allowed to hold political and social power and women were not. As mentioned above, women did not have the ability to move into these spheres, so they took control over the only thing they had power over, their bodies and their food (Bynum, 1987, p. 191).

Both male and female saints, as well as just monks and nuns, are characterised by their chastity, they were both expected to give up, essentially, their biological sex. However, the descriptions of these struggles were very different for men and women. In stories of saints, men were portrayed as fighting against sin and lust coming from external sources, whereas women are described as having to fight their own bodies, which were thought to be more 'prone by nature to the lusts and vanities of the flesh' (Weinstein and Bell, 1982, p. 235-6). The things male and female religious persons were defined by were things that were important to their cultural gender, either power or renunciation. Both men and women, however, gave up sexual intercourse, the possibility of children and other aspects of their biological sex. In this way, the medieval religious ideal was that of an individual free from both their biological sex and their gender, and free to concentrate solely

on their faith without the ties of their bodies.

This difference in view of men and women, both as physical entities, i.e. dietary restrictions on women and their cognitive abilities, as well as spiritual ones, women being generally thought of as more susceptible to sin, may have had an impact on the quality of life of nuns. In the physical aspect of their lives, the society belief that they were less able to manage their own finances and resources would have left them with less socio-cultural and political clout then their male counterparts. The dietary restrictions, as mentioned above, could also have had an impact on their health. The social beliefs regarding their spiritual contribution could also, as mentioned above, have impacted on the level of investment, leaving them with fewer resources to draw on and leaving them open to the physical problems associated with reduced access to resources.

In terms of spiritual quality of life, the lack of emphasis on the contribution of women as well as the idea of their being inherently more sinful, may have led to a belief among nuns that their own spiritual quality of life could never be equal to that of a monk. This, however, is pure speculation and the truth beliefs of these women in regards to their own spiritual wellbeing are not available. Those societal beliefs, though, will be taken into consideration when drawing conclusions regarding the differences in spiritual quality of life between monks and nuns.

2.3.3 Standards of Life in Medieval England: Application of Archaeological and Historical Evidence

In the interest of exploring the cultural context of individuals buried at the archaeological sites used in this research, the question of medieval ideas about quality of life must be explored. Relevant to standards of living, as briefly mentioned above, the medieval Church had strong ideas about the relationship between the body and the soul. Saints were often venerated for acts of bodily abstinence and mortification (bodily abstinence, denial and vilification/mortification of the flesh). These were acts intended to harm or punish the body through pain/denial in order to atone for sins. The goal of this extreme penance was to suffer on Earth so that one did not have to suffer in Purgatory (or Hell), i.e. pain and/or abstinence to save the soul (Mowbray, 2001; Synnott, 1993; Asad 1983, p. 305).

Essential to this pain, however, was the role of the will. Both Albert the Great and Bonaventure, influential medieval theologians, maintained that in order for suffering or pain to be an act of contrition, i.e. to atone for sins committed, the individual had to want to suffer, in the same way that an individual has to *want* to sin in order for it to be a sin (Mowbray, 2001, p. 65). The most well known example of this kind of atonement was the practice of self-flagellation, in which people would beat themselves with leather straps (Mowbray, 2001, p. 73; Lambert, 2002). This is in accordance with other medieval Christian practices, which disciplined the will of the individual towards God's Will, and, in religious contexts, was the very goal of the religious life.

In addition to penitential pain, was the role of general asceticism, the practice of restricting one's diet and physical comforts in order to achieve a kind of spiritual enlightenment, to become more in tune with God. This kind of asceticism was not uncommon in the medieval world and can be traced from the biblically recorded suffering of Jesus, through the eastern desert fathers, to the communal asceticism of monasteries and nunneries (Synnott, 1993). Thomas a Kempis wrote about the benefits of penitential pain and a life lived in asceticism:

> 'If thou wilt be my [Jesus'] disciple, deny thyself utterly.
> If thou wilt possess a blessed life, despise this life present.
> If thou silt be exalted in heaven, humble thyself in this world.
> If thou wilt reign with me, bear the cross with me.
> For only the servants of the cross can find the way of blessedness and of true light.'
> (Kempis ND, Book 3 Chapter 56)

Talal Asad groups the ancient and medieval practices of torture and trial by ordeal in with the tradition of religious asceticism (Asad, 1983). All three, he argues, use pain or suffering in order to attain truth. Trial by ordeal used pain to obtain a true judgement, torture used pain in order to produce true information, and in asceticism the body was 'to be chastised…because it [was] an obstacle to the attainment of perfect Truth' (Asad, 1983, p. 298, 306). The hallmark of many saints' lives was their extreme ascetic way of life, depriving themselves of food and shelter and generally punishing their bodies in an effort to achieve closeness with God, to align themselves with the suffering of Christ (Bynum, 1987, p. 114).

Hagiographic accounts of the lives of these individuals read like inspirational guides to punishment. Individuals beating themselves bloody, going without food or water for days, even weeks, eating or drinking pus and scabs from the bodies of people infected with leprosy, and many other extremely imaginative ways of harming oneself (Bynum, 1987, p. 120-40).

The medieval Church, however, recognised that the extreme asceticism of some of the saints was not for everyone and that it could not expect ordinary citizens, or even the clergy, to practice what the modern Western world might call such extreme self-harm (Woolgar, 2006, p. 193; Bynum, 1987, p. 83; Henisch, 1976, p. 8). In order to assess what was expected of the individuals represented in this study, it is first important to understand the world in which they lived, and particularly how the laity lived. This will be followed by a discussion about how these expectations differed between men and women, and the section will conclude with an examination of the debate around the body/soul dichotomy.

(i) The 'Standard of Life' in Medieval England

There is no doubt that an individual's diet affects their health and immune system (Waugh and Grant, 2006, p. 270-1). The diet of people in medieval England would have been affected by a

variety of factors, including their social status or wealth, whether they were living in an urban or rural area, what region they were living in and if they were living as part of a religious community or aristocratic household (Dyer, 2009; Hammond, 1995; Harvey, 2002; Dyer, 1989; Henisch, 1976). This section will discuss the potential differences in diet in relation to these variables and finish by exploring how these different diets could have affected an individual's health and immune system strength. The two main areas discussed in terms of historical standard of living are issues of diet and issues of environment or living conditions.

Research on the Medieval Standard of Living

This section will focus on what is known about 'standard of living' in medieval England. The environment within which a person lived and the food they ate varied considerably in the medieval period and was dependent on a number of factors, including income, region, location, and social class. Far more is known about the dietary aspects of standard of living of wealthier individuals than poorer individuals due to the fact that some, but by no means all, large estates kept periodic records of their kitchens while poorer households did not (Bouchard, 2002, p. 28-9; Dyer, 1989, p. 27). Many of these kitchen records are associated with either large feasts, when the giver of the feast might want a record of his generosity or to keep track of his expenditure, or times of hardship, when every purchase mattered (Bouchard, 2002, p. 28-9; Dyer, 1989, p. 27). That being said, research has also looked into the diet and living conditions of those who did not leave written records, namely the majority of people either on a middling income or the poor, and this section will attempt to cover all income levels, as monastic institutions could belong to any of them.

Income

The question of the income and purchasing power of an individual or group is an extensive and complicated one (see Dyer, 2009 for full discussion). In the early thirteenth century, a skilled carpenter or thatcher could expect to bring home between just over £2 per year (or 2d per day), raising to over £3 per year (3d per day) by the end of the century, while a royal mason could expect to bring in closer to £5 per year (4d per day) (Dyer, 2009, p. 240; Davis, 2004, p. 477). By the beginning of the sixteenth century, however, a skilled carpenter would be earning over £7 per year (Dyer, 2009, p. 240).

Diet

The medieval diet was based around the consumption of bread and grains (Hammond, 1995, p. 2; Davis, 2004, p. 465; Dyer, 1998, p. 59). The different kinds of bread and/or grains consumed were affected by all of the variables mentioned above. Bread was so important, in fact, that regulation was put in place in the thirteenth century (and remained in the law until the early eighteenth century) to ensure that even the poorest people would be able to purchase at least some bread (Davis, 2004). Depending on the price of the grain, a loaf of bread would vary in size and weight, but every baker was required to sell a loaf of bread for a single farthing (Davis, 2004, p. 469). A

farthing was 1/4 of a penny or 1/8 the daily wage of a skilled carpenter in the thirteenth century. The grain being used in these farthing loaves would have been the cheapest grain available, was coarse ground and would often have peas and beans included in it to increase its bulk (Davis, 2004, p. 470).

Wheat bread was the most common type found and was more desirable, but in some regions other grains, such as oats in the North and barley in East Anglia, would have been used with more regularity in the farthing loaves, as they were cheaper to produce because of the local soil chemistry (Hammond, 1995, p. 2; Davis, 2004, p. 470; Dyer, 1989, p. 154). By the end of the period, however, more labourers would have been able to afford and preferred to buy and consume 'white' bread, that is bread made from finer ground wheat with no additives (Dyer, 1998, p. 67-8). There was also a move towards the end of the medieval period for an increase in fresh (rather than salted) meat, more cheese, and a greater variety of fish and spices for the peasant classes (Dyer, 1998, p. 67-8; Dyer, 1989, p. 159). This was a result of the rise of a stronger labour market following the labour shortage after the devastating 14th century AD Black Death (*ibid.)*.

The aristocratic diet would have, almost ironically, been far less healthy than the peasant diet. A peasant's diet would have included very high fibre bread and a wide range of vegetables, with only small portions of meat, fish, cheese and fats (Albarella, 2005, p. 73; Dyer, 2006, p. 35-6; Freedman, 2005, p. 1215; Crabtree, 1990, p. 171; Dyer, 1989, p. 154-60). A higher class diet, however, would have relied on 'white' bread, with far less fibre, fewer vegetables, which were thought to be a low class food, more meat or fish and a cooking style that would have produced very rich, i.e. high calorie, foods (baronial and greater households used rich sauces, using butter and cream, and combinations of ingredients). Although fruit and vegetables were eaten, they were not as much of a staple food in the diet and were occasionally served as a demonstration of wealth, especially if they were exotic and imported (Dyer, 2006, p. 28-36; Hammond, 1995, p. 12). The portions were also significantly larger, leaving the potential for the problems associated with weight gain (Hammond, 1995, p. 71; Woolgar, 2001).

It is generally thought that the monastic diet would have been more similar to the aristocratic diet, especially towards the end of the period (Harvey, 2002). In her study of the records of Westminster Abbey from 1495-1525, Harvey estimates that the average daily (on a non-fast day) allowance of calories for the average monk would have been approximately 6210kcals (Harvey, 2002, p. 70). For a similar period, Woolgar (2001, p. 17) found that, in the household of Henry Stafford, a noble but not especially high aristocrat, a 'gentle' member of the household would have had access to approximately 6187kcal per day. In the house of the Earl of Warwick, a powerful aristocrat, a 'gentle' member of the household would have had access to up to 12928kcal per day (*ibid.)*. Although not as ludicrously high as the Earl's household, a monk at Westminster Abbey would have had access to a diet similar to that of the mid-level nobility (Harvey, 2002, p. 71). Modern

recommendations suggest that an active man should consume between 2200-2700 depending on age and an active women between 1800-2300, also dependent on age (SACN, 2011, p. 85). From the 12th century onwards there would have been an increasing distinction in foodstuffs eaten by the abbot or prior and other monastic officers, from that eaten in community by the majority of the choir monks as the period saw the heads of houses emerge as significant householders and communal living broke down.

The diet of urban dwellers, as compared to their rural counterparts, is believed to have been more varied, as it could have been comprised of a variety of foodstuffs supplied by traders from both the local surrounding countryside, as well as from regions and countries further afield. Rural consumers were far more tied to the 'annual cycle of temporary indulgence and real deprivation' meaning that if a crop failed there were few opportunities to substitute it in rural communities, as wild produce such as nuts and berries could support a family, but not an entire village (Dyer, 1989, p. 160). Town councils and governments, on the other hand, would have stockpiled grain and other easily stored foods against such conditions and would have also been able to source food from farther away, as mentioned before. Rural communities do not appear to have had the capital to stockpile resources to the same extent (Dyer, 1998, p. 60; Dyer, 1989, p. 160, p. 196). The exceptions in both rural and urban living would have been households of very high status who sent stewards to buy foodstuffs and imports from major ports, markets, and fairs for their manors and castles (see below).

Larger monastic institutions, including those located on urban, suburban, and rural estates, would have had similar resources for storing food, while the smaller monasteries and nunneries, especially, but not limited to, rural estates, would have been more exposed to the dangers of crop failure. The wealthier members of society, including many of the monastic institutions, are thought to have had a more varied diet than even those in towns and, of course, to have had access to a wider variety of exotic foods and spices (Ambrose, 2006, p. 14; Hammond, 1995, p. 42-70). Other rural or poor monasteries and nunneries, however, would have been as tied to the seasonal cycle of plenty and want as any other poor, rural community (Dyer, 1998, p. 60).

Living Conditions

The environment in which an individual lives or lived also potentially has a great impact on their quality of life. Living in squalid conditions can leave a person open to a variety of health problems, such as cholera, typhoid and dysentery, transmitted via contaminated water (Harrison and Fauci, 2008, p. 1647-55). The medieval period is often characterised in popular culture, films or books as having been a time in which people's homes and environs were unsanitary and filthy. The city of York, for example, appears to have had a significant problem with the run off from metal working contaminating the River Ouse, one of the city's main fresh water supplies, with lead and other industrial by-products during the 9th through to the 13th centuries (Hudson-Edwards and Macklin,

1999, p. 817-8).

There are a number of written sources to suggest that local governments were concerned with keeping cities free of refuse, primarily centred around the proper disposal of household and industrial waste. This was partially because local governments recognized that the build up of waste within city walls was harmful to people's health, although the prevailing belief at the time was that the hazard came from the bad smells of the waste (Jørgensen, 2010, p. 37).

However, many of the documents record a clean-up effort because the refuse had built up to staggering proportions, suggesting that these issues were not addressed until the problem had reached severe levels (Jørgensen, 2010; Keene, 1982; Cooper, 1913). Another problem faced by these local councils was with the provision of facilities for waste disposal in place in most English cities. Waste would be washed from the streets, down drains or troughs, into ditches surrounding the city or into the river that ran through it (Cooper, 1913, p. 272; Keene, 1982, p. 26). These ditches eventually were filled and the rivers became blocked and so polluted that the public complained that the water was too foul to drink (Jørgensen, 2010, p. 37).

The solution to these problems was two-fold, in most cases. Preventative measures would first be put in place, regulating proper waste disposal and fining those who failed to comply. Following these measures, direct action would be taken to remove the offending material from the streets and/or river. Most cities, it would appear, made household waste disposal the problem of the individual house, and people had to find a better place for their rubbish than their doorstep (Keene, 1982, p. 28).

Sabine's (1937) work on the mechanics of keeping London clean in the late medieval period reveal a city government that was involved at all levels in preventing the build up of refuse and waste. He discusses the imposition of taxes and fees from a variety of different levels within the city's government and the importance of the city's 'rakers,' a group of individuals charged with gathering refuse and waste and carting it out of the city (Sabine, 1937, p. 21-3). Even with the extensive preventative measures put in place, the city of London had a reputation for being a filthy place and there were numerous city-wide cleaning measures undertaken when the problem became overwhelming, all the way up until the nineteenth century (Sabine, 1937).

The city of Norwich, after decades of struggling to keep their river clear of waste, set out a tax specifically to fund the clearing of the river, the provision of community dung carts and the money to employ a permanent street cleaner. They also set about reworking the entire drainage system, including individual building gutters and the drains running down the streets, to help solve the problems of waste disposal within the city. In order to keep things as fair as possible, Norwich council charged industrial producers of waste, such as butchers and tanners, a higher tax

(Jørgensen, 2010, p. 46-9), and in the medieval city of York, butchers and tanners were forbidden to dump the animal by-products of their industry into rivers or streets, eventually requiring butchers to give their industrial waste to local farmers for use as fertilizer in the fields (*ibid., p. 4*2).

However, many of the pollutants found in medieval cities would have also been found in more rural areas. People would have still been burning wood and sea-coal in their homes, filling the small rooms with smoke and particulates. Lime-burning and tanning would have been practiced, although on a much smaller scale than in a city (Dyer, 2003, p. 170; Brimblecombe, 1975, p. 389). In rural areas the smoke and particulates would have been able to dissipate more easily, but individuals living in these areas would still have been exposed to them, albeit not at such high levels as in towns and cities (Roberts, 2007; Lewis, 2002, p. 221).

Another potential health risk for both urban and rural populations was that of zoonoses, or diseases contracted from animals, and/or diseases associated with close contact with animals, such as tuberculosis or bubonic plague, just to name a couple (Roberts and Manchester, 2005, p. 184-5; Howe, 1997, p. 88-90). People living in both urban and rural environments and of both high and low status would have had daily contact with animals. Living this close to animals could have left people open to a variety of diseases, often those affecting the gastrointestinal tract (Hale et al., 2012).

The building materials used in the construction of houses and other living quarters varied considerably depending on income and location. Wood, wattle and daub, and other organic materials dominate in the earlier part of the late medieval period, with stone being used for foundations in rural settlements as time went on (Dyer, 1989, p. 160-1). Previous "earthfast" methods had been prone to rot and would need replacement on a regular basis (Dyer, 1989, p. 160-1). Dyer's (1989, p. 168) assessment of peasant housing in the late medieval period is rather grim, suggesting that, while kept as clean as possible, the earthen floors would likely have meant a damp house, with an open hearth giving off insufficient heat and higher than comfortable volumes of smoke. He also suggests that the thatch roofing would have been warm, but may have encouraged vermin, increasing the likelihood of the spread of disease, including The Black Death (*ibid.)*.

Education

According to Roberta Gilchrist (2012, p. 147), children were expected to be productive members of the family, meaning that they were often involved in both cottage (home-based) industries and more formal work. She asserts that many children, especially urban children, were taught to read, estimating that roughly half of the male population of London could read English or French by the 15th century (*ibid.)*. Most of this education would have taken place in the home, with boys having more opportunity than girls to attend any kind of more formal education (Gilchrist, 2012, p. 147). This education, as with anything, would have been dependant on the ability of the family to pay for

it and/or to spare a wage earner, even a child, for any substantial period of time during the day. Power (1922, p. 265-9) points out that, in her examination of the rosters for nunnery schools, the names of the boys and girls attending are all from either the "noble classes" or, in the later period, from the emerging middle class.

Land access

Another example of the differences in the quality of life would have been the amount of land needed to sustain individuals from the various social classes. Bond estimates that, with the inclusion of a small vegetable garden, a single monk would have required 5-6 acres to maintain his standard of living (Bond, 2001, p. 44). Hammond (2005, p. 26), on the other hand, estimates that a single lay person could live on the produce of 1-2 acres, also with a small garden, significantly smaller than Bond's estimate of 5-6 acres for a single monk. If these estimates were correct, this would imply that monks were enjoying a higher status lifestyle than the average lay person.

Moving on from this, Dyer (1998, p. 60) estimates that a well-off peasant family could happily live off 30 acres, including a small vegetable garden, and still have enough produce to be able to sell excess for other items. He suggests that those families living on 15 acres and a small garden would have been able to survive, but probably not thrive (Dyer, 2009, p. 163). Hammond suggests that those growing food for sale rather than subsistence would require slightly less and that a family would need between 5-10 acres, to grow enough corn if they were going to be growing it as a cash crop (*ibid.)*.

Life Expectancy

Lay people and those living in a religious community were exposed to many of the same risk factors including, but not limited to, disease and pollution. Lay people, however, also had several lifestyle differences that exposed them to additional danger and risk. For the working population, including men, women, and children, farming and industrial accidents were always a possibility (Gilchrist, 2012, p. 60-1). Many men also faced the dangers associated with open warfare (Gilchrist, 2012, p. 56-8), although this could also have a direct impact on the lives of women and children if they were living near any fighting. Most women outside nunneries also faced the additional risks associated with childbirth, which is reflected in the spike in mortality rates of women aged 25-35 at St Helen-on-the-Walls, York (Grauer, 1991). Keeping (2000, p. 190) found that, in comparison with women associated with nunneries and monasteries, the life expectancy of laywomen at age 20 was between 3-4 years less.

Impact on Physical Quality of Life

Even if a monk ate only half of what was given to him, a distinct possibility given the monastic ideal of charity, their caloric intake would have required high levels of activity to prevent obesity (Harvey, 2002, p. 70). The lack of central heating would have helped here, because the body uses

calories to keep warm but, even so, monks and nuns at wealthy houses, along with members of the nobility, would have had the potential to become obese (*ibid.)*. As there are no written records that can be used to estimate similar data, i.e. caloric intake, for either poorer monastic institutions, average town dwellers or rural peasants, a one-to-one comparison cannot be made. However, it can be assumed that similar access to such a high calorie diet would not have been a possibility for the poor.

A diet that is tied to seasonal availability and scarcity brings with it certain health problems. Likewise, a diet that is consistent in its excesses brings different health problems. Any deficiency in an individual's diet can lead to health problems, including scurvy (vitamin C deficiency) and iron deficiency anaemia, as well as leaving the immune system less able to combat pathogens (Beldomenico et al., 2008; Harrison and Fauci, 2008, p. 1647-55; Mertens and Gertner, 2011).

The problems associated with dietary excess are fairly well known as well and can include cardiovascular disease and/or diabetes and joint problems (Hsia et al., 2010). It is also important to note that just because an individual's diet includes a lot of calories it can be deficient in various nutrients needed by the body, as in this case where medieval nobility considered vegetables to be food fit primarily for the poor (Dyer, 2006, p. 36; Freedman, 2005). There would, inevitably, have been regional variations in diet and archaeology, through the remains of food consumed and in the analysis of ecofacts from the immediate food-producing landscape, has the potential to increase the level of resolution in reconstructing diet in specific locations. This level of detail is not always, however, available in conjunction with excavated cemetery populations.

The differences in recorded and hypothesised diets between the high status, the monastic, and the lay people in medieval England likely resulted in differences in stature, the ability to fight off disease, and other health and developmental concerns. These issues could easily have influenced the quality of life of the different groups.

Aside from the pollution of the rivers, cities struggled with the pollution of their air. The burning of wood and sea-coal for heating and cooking would have caused heavy particulate levels both indoors and outdoors. In industrial settings, this would have been added to by the burning of lime for building, metalworking and other industries (Dyer, 2003; Hale et al.. 2012; Howe, 1997 Brimblecombe, 1987; Brimblecombe, 1975). High levels of such particulates have been associated with the development and/or the irritation of maxillary sinusitis (Roberts, 2007).

Additionally, water contamination from industrial practices would also have had a potentially serious impact on human health, the lead contamination in the city of York, as discussed above, could have caused low tooth enamel leaving people at risk for a variety of dental diseases (Budd et al., 2003, p. 56; Hudson-Edmonds and Macklin, 1999). It has been found, through isotopic testing

of human tooth enamel, that the presence of lead steadily increased from the Neolithic period to the Industrial Revolution, with a sharp rise during the late medieval period (Budd et al., 2003, p. 56).

The combination of so many households and the industrial air pollution within a small, geographical area would have made cities potentially hazardous places to live. Although, as discussed above, the particulates and diseases associated with living in close proximity to animals could be problematic for both urban and rural communities (Brimblecombe, 1987). Some studies of skeletal remains have actually found higher rates of respiratory infection in "rural living" people than in urban populations (Roberts, 2007; Lewis, 2002, p. 221).

A survey of the levels of lead in the sediment of four lakes in Northern Sweden found that the period of AD 1200-1530 produced a peak in lead particulates in the atmosphere even higher than that of the Industrial Revolution of the 18th century (Brännvall et al., 1999, p. 4391). The authors attributed this peak to the re-opening of older lead mines as well as the discovery of new ores (*ibid., p. 4*393). High levels of particulates in the air can initiate, or exacerbate, existing respiratory conditions.

Summary of Medieval Physical Quality of Life

Medieval physical quality of life would have varied dramatically between different demographic groups. The access an individual or group had to land, income, and education would have affected their diet and, potentially, their living conditions. These would have had an impact on their physical wellbeing. Those varying degrees of access to land, education, and income would have had an impact on their socioeconomic wellbeing. These are the elements that will be explored in the discussions about the differences in the physical quality of life between monks and nuns. However, the medieval concept of quality of life would have also had another aspect, that of the quality of life of their spiritual body.

(ii) Impact of the Spiritual in Medieval Quality of Life

Relevant to standards of living, as briefly mentioned above, the medieval Church had strong ideas about the relationship between the body and the soul. A brief discussion will be made here about how this relationship could have affected an individual or group's quality of life.

Medieval Relationship between Body and Soul

Saints were often venerated for acts of bodily abstinence, denial, and vilification/mortification of the flesh. These were acts intended to harm or punish the body through pain/denial in order to atone for sins. The goal of this extreme penance was to suffer on Earth so that one did not have to suffer in Purgatory (or Hell), i.e. pain and/or abstinence to save the soul (Mowbray, 2001; Synnott, 1993; Asad, 1983, p. 305).

Essential to this pain, however, was the role of the will. Both Albert the Great and Bonaventure, influential medieval theologians, maintained that in order for suffering or pain to be an act of contrition, i.e. to atone for sins committed, the individual had to want to suffer, in the same way that an individual has to *want* to sin in order for it to be a sin (Mowbray, 2001, p. 65). The most well known example of this kind of atonement was the practice of self-flagellation, in which people would beat themselves with leather straps (Mowbray, 2001, p. 73; Lambert, 2002). This is in accordance with other medieval Christian practices, which disciplined the will of the individual towards God's Will, and, in religious contexts, was the very goal of the religious life.

In addition to penitential pain, was the role of general asceticism, the practice of restricting one's diet and physical comforts in order to achieve a kind of spiritual enlightenment, to become more in tune with God. This kind of asceticism was not uncommon in the medieval world and can be traced from the biblically recorded suffering of Jesus, through the eastern desert fathers, to the communal asceticism of monasteries and nunneries (Synnott, 1993). Thomas a Kempis wrote about the benefits of penitential pain and a life lived in asceticism:

> 'If thou wilt be my [Jesus'] disciple, deny thyself utterly.
> If thou wilt possess a blessed life, despise this life present.
> If thou silt be exalted in heaven, humble thyself in this world.
> If thou wilt reign with me, bear the cross with me.
> For only the servants of the cross can find the way of blessedness and of true light.'
> (Kempis ND, Book 3 Chapter 56)

Talal Asad groups the ancient and medieval practices of torture and trial by ordeal in with the tradition of religious asceticism (Asad, 1983). All three, he argues, use pain or suffering in order to attain truth. Trial by ordeal used pain to obtain a true judgement, torture used pain in order to produce true information, and in asceticism the body was 'to be chastised…because it [was] an obstacle to the attainment of perfect Truth' (Asad, 1983, p. 298, 306). The hallmark of many saints' lives was their extreme ascetic way of life, depriving themselves of food and shelter and generally punishing their bodies in an effort to achieve closeness with God, to align themselves with the suffering of Christ (Bynum, 1987, p. 114).

Hagiographic accounts of the lives of these individuals read like inspirational guides to punishment. Individuals beating themselves bloody, going without food or water for days, even weeks, eating or drinking pus and scabs from the bodies of people infected with leprosy, and many other extremely imaginative ways of harming oneself (Bynum, 1987, p. 120-40).

Impact of this Belief on Quality of Life

The medieval Church, however, recognised that the extreme asceticism of some of the saints was not for everyone and that it could not expect ordinary citizens, or even the clergy, to practice what the modern Western world might call such extreme self-harm (Woolgar, 2006, p. 193; Bynum,

1987, p. 83; Henisch, 1976, p. 8). Meaning that a rigidly ascetic lifestyle could have detrimentally impacted an individual's physical quality of life.

In terms of overall quality of life, however, it is possible that medieval people believed (or at least some of them did) that the two would have balanced out. As it is not possible to know how many people believed this and the way these two aspects of a person's quality of life would have been weighted in such a comparison, the two aspects will be considered separately in this research, with the understanding that both made up an important part of the medieval concept of quality of life.

2.4 Towards and understanding of the English Monastic Standard of Living

Studies of the health of modern living monks and nuns have found that, on average, individuals living in monastic communities tend to have a higher life expectancy than the general population (Flannelly et al., 2002). Among nuns, the prevalence rates of cardiovascular disease, respiratory disease, and smoking related cancers were considerably lower than the general population, while ovarian cancer rates were similar (Butler and Snowden, 1996; Kinlen, 1982). In 1713, Ramazzini famously labelled breast cancer an occupational problem among nuns (Fraumeni et al., 1969) and later in a modern study, this disease was found to be 20% higher in nuns than in the general population, but 10% lower than among female radiograph technicians (Doody et al., 2000). The blood pressure of nuns has also been recorded as not increasing with age as it does in the general population (Timio et al., 1999).

Monks have also been recorded as having higher life expectancy since 1959 than the general population, as well as reported better health, with lower rates of reported disability or illness (de Gouw et al., 1995). Prevalence rates for heart disease and asthma or chronic bronchitis were also lower among monks when compared to the general population (Mackenbach et al., 1993, p. 571). However, the monks reported more problems with mobility than the general population, including standing from a sitting position (*ibid.)*. Mackenbach et al. (1993, p. 573) conclude that a prolonged life, in this case due to a 'prudent lifestyle,' increases the risk of disability in later life. In the medieval period, abbots and priors of small houses were considered to have a social rank akin to the knights and lesser gentry, although abbots and bishops were similar to Barons and Dukes in their standard of living (Dyer, 1989, p. 12). Archaeological and documentary evidence will now be reviewed to assess the standard of living of people both in monasteries and nunneries in general.

2.4.1 Aspects of Life in Male Religious Houses

Any study of monasticism in England is incomplete without a discussion of Dom David Knowles' lifetime of scholarship on the topic. His trilogy, *The Religious Orders in England Volumes 1, p. 2 and 3*, represents the most comprehensive study of monastic life and history from 1216 to the Dissolution and beyond. Some of his other works also deal with pre-13th century records. These works chronicle the decline of the monasteries, exploring their finances, economy, spiritual and

moral practices, bureaucracy, day-to-day life and their place in society as a whole. He noted several issues that may have had an impact on the quality of life of the monks, for example, the practice of granting clothing allowances is considered the first step in the practice of monks setting up their own household within the larger monastic estate (Knowles, 1955, p. 240-7). As some of these households could have been better provisioned, had better sanitation, etc. there is the potential for internal differences in quality of life within a single monastery.

This desire for privacy could also be seen in the increasing demands of students returning from university to have a larger study area than just a simple carrel or desk area (Knowles, 1948, p. 289). Eventually monks were even released from memorising all the psalms, lessons and chants as many of the older noviciates found it difficult and the returning students found it boring (Knowles, 1955, p. 232). In general there was a relaxation in strictness, with leisure and conversation times being extended. This had the effect of reducing the number of bleedings being taken by the monks as this was one of the few times they were allowed to converse with each other (*ibid.,*245). Bleedings, or seyneys, also occasioned one of the few times at which monks were technically allowed to eat meat but, as discussed, this changed over time. In general, Knowles paints a picture of an overall relaxation of the rules as time passed. He suggests a number of contributing factors to this decline, but mostly attributes it to a general decline in religious fervour in society as a whole (Knowles, 1959, Epilogue).

In this way we can determine that, although strictly regimented, the lives of medieval monks may have started out hard and ascetic, but then may have changed over time to something akin in comfort and diet to between a merchant and an aristocrat. Of course, there would have been exceptions to this; monks in poor or very devout houses would have led lives more similar to the ascetic life laid out by Benedict. However, the volumes of research on monastic lives suggest that the majority had a higher standard of living than the majority of the lay population.

(i) Implications of Monastic Rule

The Benedictine Rule written by Benedict of Nursia was written to give a monastic community a set of guidelines that gave instructions for the diet, living arrangements, and daily schedule. These instructions could, if followed to the letter, have resulted in reductions in an individual's or group's quality of life.

- Diet: The Benedictine Rule forbids the consumption of meat and, although iron deficiency could have been a problem, a low protein is generally considered healthy for most age groups (Levine et al., 2014). Later adaptions or amendments to the Rule, however, allowed the consumption of meat, or at least made it easier to access, with Harvey suggesting that the problem faced by monks was not a lack of protein, but rather too much (Harvey, 2002, p. 66). A high level of protein (and fat) in the diet can lead to a variety of health issues, including cancer, high cholesterol, clogged arteries,

high blood pressure, diabetes, etc. (Levine et al., 2014).

- Diet: The suggested serving size of ale, according to Harvey (2002, p. 58), could have been as much as a gallon a day. Although, it must be remembered that the majority of these drinks would have been watered down. She estimates that 19% of the energy in a monk's diet would have come from ethanol, compared with the 5% that is average today (Harvey, 2002, p. 58). This high intake of alcohol could result in a number of health issues, including some cancers, cardiovascular disease, and liver problems (Room et al., 2005).
- Living arrangements: The communal living arrangements advocated by Benedict would have opened the monks up to a potential breeding ground for communicable disease (Harvey, 2002, p. 130-2). However, the Rule did have strict requirements for the set up and maintenance, including regular cleanings, of the latrines, which may have helped to stave off a number of related diseases and parasites (Harvey, 2002, p. 79).
- Schedule: Benedict's suggestion for the daily schedule allows for a total of 8 hours of sleep in the winter, but only 5 hours of sleep in the summer (Burton, 1994, p. 161). Modern recommendations are for an average of 7-8 hours; the associated health risks of sleep deprivation include obesity and DISH as well as a number of behavioural problems, including feeling irritable or more stressed (Spencer, 2008, p. 255; Gangwisch et al., 2005).

As discussed above, many of the rules advocated by Benedict were overlooked or amended over time. However, these changes were not always for the best and may have actually worsened the quality of life of the inhabitants of monasteries. The following section will explore the evidence for the standard of living in English monasteries in the later medieval period.

(ii) Evidence for Standards of Living

Income

In 1926, Snape explored the opportunities and pitfalls associated with using monastic financial records in reconstructing daily life. He points out that not only are the records very rare (or in the case of friaries and nunneries non-existent), but they usually only represent the accounts of one of the offices of any religious institution (Snape, 1926, p. 3, 37). Each of the individual offices held within a religious house, sacrister, cellarer, kitchener, etc., would have their own income and expenditure through donations and commerce, but the records relating to these accounts were not centrally held by the treasurer (Snape, 1926, p. 50). Even the visitation records of the bishops would have been incomplete and possibly unreliable because of the complexity and range of the various accounts. Snape (1926, p. 66) suggests that the abbot might not have been able even to keep track of all of these accounts, much less a visiting bishop.

Between the varying subsistence practices and the scarcity of records, an exact picture of individual monastery's finances is difficult to produce. A broader picture, however, of monastic life, suggests that the average monk was not wanting. Monasteries were the corporations of the medieval world, controlling land and wealth.

Many of the accounts of the obidentary officers of Abingdon Abbey, a Benedictine house in situated in the Thames Valley, survived and offer a glimpse of the wide range of the types of properties that were held by monasteries, as well as the administrative structure in place to manage estates of this size (Bond, 2003, p. 154). These accounts show the management of the properties that were assigned to the various offices towards the later part of the period in question, as had become common (*ibid.*). Many accounts list the produce sold from the estates, including apples and other fruit, wine, cider, and fish from monastic fishponds, as evidenced by the infirmer selling apples and cider in 1388-9 (Bond, 2003, p. 162-3). They also hold records of the purchase of the various supplies to maintain these properties, as well as support the monastery as a whole. For example, the kitchener's account shows a record of the need for the monastery to purchase at least 12 different kinds of fish in 1377 and onions and other "exotic" foods in 1440-1, while the gardener spent extra money in 1450-1 to maintain the basketwork fish traps kept in the moat of the main monastery estate (Bond, 2003, p. 157, 187, 202).

Diet

The medieval cliché of the fat, jolly monk can be found throughout medieval satire. From as early as the 12th century, monastic overindulgence was being highlighted as a feature of the religious community; by the 14th century, these concerns and characterisations were firmly in the public sphere (Patrick, 2004, p. 97-8). This stereotype is seen in modern portrayals of medieval monks and friars, most notably in the character of Friar Tuck in the stories of Robin Hood. A more complete discussion of the public perception of the clergy is found below in section 2.4.3.

This portrait has proved an area of fascination for historians and archaeologists alike. This section examines what has been concluded through research in various disciplines, historical, archaeological, bioarchaeological. Barbara Harvey's conclusions suggest that, given the diet served at Westminster, obese monks may have been a common sight (Harvey, 2002). Her book, originally published in 1995, outlined the yearly food consumption of the abbey at Westminster, based on various administrative records that survive. From this, she was able to extrapolate an average monk's daily intake of calories. Her determination for each monk was given at between 4,470 and 6,210 calories, depending on the time of year, suggesting that monks in wealthy monasteries were consuming well above the modern recommended daily intake of 2300-2700 calories for a reasonably active man, dependent on age, although Harvey suggests that the monks at Westminster were likely living fairly sedentary lives (SACN, 2011, p. 85; Harvey, 2002, p. 66-67). However, she suggests that the monks probably did not eat their entire allowance, given the charitable

practice of saving leftovers for the poor. Even so, the diet of the Westminster monks would have, at the very least, proved a strong temptation towards excess (Harvey, 2002, p. 66-7).

This excess is often blamed for the higher levels of DISH (diffuse idiopathic skeletal hyperostosis) seen in people buried in medieval monastic cemeteries. In 1985 Waldron wrote an article in the *British Medical Journal* suggesting, in a "tongue and cheek" way, that DISH might have been so prolific in monastic communities that it could be considered an occupational disease (Waldron, 1985). Considering beliefs about the diet and standard of living at monasteries in the later medieval period, it is perhaps not surprising that a disease frequently associated with over indulgence and obesity has been linked to them (Rogers and Waldron, 2001, p. 362).

Related to this idea, Spencer's dissertation examined the frequency of DISH within some monastic cemetery populations from medieval England. She found that, while there was no significant difference between the monastic and non-monastic populations in terms of frequency of DISH, there were high nitrogen isotope values for individuals with DISH (Spencer, 2008, p. 248). Spencer concluded that this might be the result of increased pork or fish in the diet of those who suffered from DISH (*ibid.)*. The development of DISH may therefore be influenced by diet, but not necessarily a high status diet (Spencer, 2008, p. 253). She also explored modern clinical research on the condition and concluded that, although popular belief attributes DISH to a rich diet, its aetiology may be more closely related to the way individuals process sugar and insulin as well as the average amount of sleep they get per night (Spencer, 2008, p. 238). She also explored whether DISH involved a genetic component using ancient DNA analysis, suggesting that genetic defects in sugar and insulin processing may also include a predisposition to developing the condition, but was unable to make any conclusions on the issue due to the time limit of the project (Spencer, 2008, p. 257-263). Modern clinical studies have also suggested a genetic component to DISH, but none have been able to substantiate these theories fully (Spencer, 2008, p. 156-8; Kiss et al., 2002; Goto et al., 1995).

In her, 2004 PhD thesis, Patrick attempted to establish whether the stereotypical obese monk was based on reality through skeletal analysis. She used a combination of several weight regression measurements developed for studying skeletal remains using a skeletal collection derived from early 20th century known individuals (Robert J. Terry Collection, Smithsonian Institution, Washington DC). These regression equations had been originally developed for use on early hominids and Neanderthals, Patrick modified them for use on modern humans (Patrick, 2004, p. 147-158). She also used a method for establishing the area of cortical bone present using radiographs to calculate the diaphyseal cortical area, using a method developed by Ruff et al. (1991) in which several measurements are taken to establish the width of the cortical bone in various areas of the femur and these are combined and measured against the length of the femur (Patrick, 2004, p. 148-9). Ruff et al. (1991) found a 'strong correlation' between the diaphyseal

area and current body weight.

From these methods, Patrick (2004, p. 394-5) found that the monks appeared to have been taller and heavier at 18 years of age than their secular counterparts, but tended to gain less weight over the course of their lives. Patrick concluded that they may have gone into monasteries healthier and better fed than the majority of the population and then proceeded to eat a richer diet and possibly spend more time inactive, which may have led to weight gain. Patrick (2004, p. 168) also explored the rates of certain diseases that have an aetiological link with obesity within monastic communities in relation to lay communities. These two conditions, osteoarthritis and DISH, are often linked with obesity.

As just discussed in the previous section, however, it is important to note that the actual role of an individual's BMI in the occurrence of these conditions is not fully understood (Spencer, 2008; Rogers and Waldron, 2001). Patrick did find that medieval monks were three times more likely to develop DISH than their lay counterparts, six times more likely to develop osteoarthritis in their fingers, and three times more likely to develop osteoarthritis in their knee (Patrick, 2004, p. 394). In short, Patrick found that individuals buried within monastic cemeteries were more likely to suffer from pathologies that may be influenced by obesity (*ibid.)*.

It has been generally agreed that monasteries and other people living in what we would call the middle and upper classes would have had a better diet and standard of living than the majority of the population, or the "peasantry."

Living Conditions

According to Harvey (2002, p. 78), the monks at Westminster had a material standard of living on par with any of the "substantial gentry," suggesting that these individuals were living in buildings that had "proportions fit for the nobility" and sanitary conditions that became the basis upon which most buildings of the gentry and aristocracy were later outfitted. However, she does go on to point out that the actual hygiene of this particular institutions, suggesting that other monasteries were likely run in a similar fashion, were not always of a high standard. As an example, she points to the practice of the cleaning out of the novices chamber in the dormitory and the changing of the straw in their beds was only done when new novices were brought in, which could be once a year, although could stretch for periods of up to three years (Harvey, 2002, p. 130-1). Harvey (*ibid.)* goes on to point out that no record was kept of how often this was done for the professed monks' chamber of the dormitory and concludes that this was likely initiated and paid for by each individual monk, when they felt the need.

Harvey (2002, p. 130-1) also makes mention of the use of curtains between beds in the dormitory, which would have allowed some measure of privacy. Knowles (1948, p. 289) also discusses these,

suggesting that the move for privacy in both the dormitory and study areas a direct result of the desires of those individuals returning from university who were accustomed to more privacy. The popularity of these partitions is reflected in the blanket outlaw of such privacy screens by the Benedictine Order (Harvey, 2002, p. 130; Knowles, 1948, p. 289).

Although the buildings in which the monks lived were, as Harvey mentioned, of a scale and splendour outside the normal lives of most lay people, they were not necessarily the most comfortable buildings in which to live. Kerr (2009, p. 45-6) notes the petitions from several Scottish and North English monasteries for special dispensation to wear caps and additional layers in the church and refectory because of the cold. Many of these were granted and it became more common towards the end of the period for refectories to have large hearths to be used to keep out the winter cold (*ibid.)*.

Education

It is well known that monasteries were prolific in producing and copying manuscripts and books, and that some monks were great scholars. Overall, monasteries were intended to be houses of both prayer and learning. The Benedictine Rule states that, depending on the time of year, monks should be reading for 2-3 hours a day, not including time set aside for private reading, if so desired (48.1-13). Each monk was also expected to complete at least one book during the six weeks of Lent (*ibid.)*.

Greatrex (2000, p. 41) points out that 'reading' was intended to be more like prayer than academic reading. The monks would read the scriptures and the writings of the Church Fathers. It is not until the formations of the orders of the friars that academic work becomes a priority for the religious orders (Greatrex, 2000, p. 42). The Benedictine order, according to Greatrex (2000, p. 49), appears to have kept up to date with all of the latest thinking from the new universities, but did not contribute to it greatly.

In her study of the curriculum for novices, Greatrex (2000, p. 44) found that the focus was on liturgical chant and the memorisation of the Benedictine Rule, the Psalter and other parts of the liturgy. She believes that many monasteries required their novices to be able to read and have some education in science, grammar, logic, and philosophy before they could be accepted (Greatrex, 2000, p. 43-4). She found many examples of individuals being turned away because their education was not at a sufficiently high level, and some were encouraged to try again after they had learned a bit more (*ibid.)*.

Many surviving inventories of monastic libraries include volumes that were commonly used in the teaching of grammar, rhetoric, logic and debate (some of the key areas in a classical education) (Greatrex, 2000, p. 456). Books on theological or spiritual matters as well as historical volumes are

also common in these inventories, suggesting that the study of both theology and history were important in monastic education (Greatrex, 2000, p. 47-51). It can be deduced from this information that monks at the larger, cathedral monasteries were exposed to a classical education, even if it was not the primary focus of the institution.

Similar information for the smaller monasteries is less known, as they have produced fewer surviving records. The inventories or borrowing records for a few non-cathedral monasteries have survived, however, and indicate that reading was not limited to only the very large and wealthy houses (Kerr, 2009, p. 180-2). Some anecdotes even suggest that some of the monks read for pleasure. For example, a copy of *The Romance of the Rose* was held at Roche Abbey in Yorkshire and the monks at Thorney Priory, Peterborough were reprimanded for having a 'bawdy' book in their collection that was described in a visitation as 'shameful and not at all fit to be committed to writing' and told to destroy it (Kerr, 2009, p. 182).

The whole of Jean LeClercq's well-known book on modern monastic culture, *The Love of Learning and the Desire for God*, suggests that every aspect of medieval monastic culture came from the monks' ability to read and have access to a fairly wide range of sources (LeClercq, 1974). Firstly, a monk must be able to read to participate in the *lecio divinia,* the spiritual readings that were central of the Rule of St Benedict (LeClercq, 1974, p. 18). LeClercq goes on to argue that if a monk had to be able to read, he had to first learn to read, an activity that would have been, at least in part, carried out at the monastery itself. These reading lessons would have incorporated classical works following the belief that they were the best way to teach Latin (LeClercq, 1974, p. 22). In short, literacy and a classical education was part and parcel of being a medieval monk.

As discussed above, whilst monasteries maintained an educational role, in the later medieval period many ceased to be the centres of learning that they had been before the advent of universities (Knowles, 1948, p. 291). With the except of St Albans, almost no writing or chronicling came out of monasteries between the Conquest and the Dissolution, and theological works were being produced at universities (Knowles, 1948, p. 295). A few individuals, outside of St Albans, are the exceptions to this rule, including Henry Knighton of Leicester Abbey, Ralph Higden of Chester, a monk from Malvern and another from Westminster (Knowles, 1955, p. 263). A few, scattered works were produced by the cathedral priories of Durham and Canterbury, but nothing in the range of the theological and other academic work being produced by the universities (Knowles, 1955, p. 268-270). The focus had shifted to copying important works rather than producing original ones.

Access to Resources

Bond has published a range of work investigating the subsistence practices of monastic institutions, including male monasteries, friaries and female nunneries, throughout England. If his estimate of the need for 5-6 acres per monk for food, ale and clothing is correct, it is unsurprising that

historians estimate that monasteries and nunneries at the time of the Dissolution held approximately 20-25% of the land in England (Bond, 2004, p. 12). Bond goes on to add that these were, as much as anything can be, 'permanent corporations.' There was no worry about who would inherit the land or the land being confiscated by secular authorities, because some of the land was held for as many as seven centuries (Bond, 2004, p. 12).

He argues that this unique position, vast tracts of land and no end to ownership in sight, meant that the monasteries could take a 'long view' to investment and development. They could take risks with the land that smaller, secular landholders just did not have the luxury of taking (Bond, 2004, p. 12). The land held would have been put to a variety of uses in order to make each institution as self-sufficient as possible. These uses included farming cereals, growing vegetables, having orchards, cow, pig and sheep rearing, beekeeping, fish farming, renting out land/buildings, milling and mining (see Bond, 2004). Some land and resources were put towards commerce, with the logic that it was still self-sufficiency if the monastery was able to pay for products and services it was unable to provide itself. In a time when the entire economy and political structure was based on land ownership, this put the monasteries in a very powerful position (Bond, 2004, p. 25).

As individual estates, however, wealth, political power and estate size varied greatly. Different orders had different agendas and outlooks; some embraced wealth, power and trade, and others shunned them. For example, the Benedictines, having been the first order, were originally given large tracts of land as foundations as well as later donations (Bond, 2004, p. 34). The Augustinian Canons, however, did not arrive in England until 1100 and missed out on much of this land donation and so "made do" with piecemeal donations and foundations, relying heavily on the incomes from theirs rights and ownerships of various churches (Bond, 2004, p. 35). Cistercians also did not arrive in England until the 12th century but, instead of small tracts of land, they were given and exploited more remote areas, including marshland and woodland. This land was better suited to pasture and so the Cistercians created vast sheep-runs (*ibid.)*. The later friar orders were not supposed to hold any land, but often did so in the shape of orchards and gardens within towns (*ibid.)*.

In terms of direct socio-political power, any large landholders had a measure of political and secular power by virtue of their land holdings and were able to influence decisions that would have impacted them, perhaps not as often as they wished, but more so than the average labourer. Abbots (and some priors) of "the greater houses" could attend parliament and serve as judges (Knowles, 1948, p. 276). It was also not uncommon for abbots, priors, or other professed men to go on diplomatic missions on behalf of the crown (Heale, 2009, p. 17).

Life Expectancy

Hatcher et al. (2006) conducted a survey of the monastic records at Durham Cathedral and

compared them with similar surveys conducted at Westminster and Canterbury Cathedrals in order to assess what the mortality profile was for the monastic community. They found that people, once reaching the age of 25, could expect to live another 35 years at the beginning of the 15th century. However, someone towards the end of the century could only expect to live an additional 20.1 years after reaching 25 (Hatcher et al., 2006, p. 674).

At Westminster, between 1395 and 1474 the average monk would live another 25.7 years after reaching an age of 25, at Canterbury life expectancy was 27.4 years and 29.5 years at Durham (Hatcher et al., 2006, p. 675). Between 1475 and 1499, however, an average monk could only expect to live another 17.2 years at Westminster after reaching 25 (*ibid.)*. Harvey (2002, p. 142-4) notes that monks at Canterbury and the Westminster townspeople also experienced a rise in early mortality during this period, that can also be seen in other demographic studies (she specifically cites Wrigley and Schofield's, 1989 work) and for which she and Hatcher et al. (2006, p. 685) have no explanation.

The discrepancy between the mortality rates of Harvey's Westminster monks and those of people living in villages, which, according to Dyer (1998, p. 304), are significantly higher, is blamed on so called 'urban' diseases, by both Dyer and Harvey (2002, p. 141).

(iii) Popular Notions and Critiques of Lifestyle

In considering a small selection of contemporary writings that feature monks and nuns, three types of writing begin to emerge. Some of these stories and writings were intended first as entertainment, without a large interest in social commentary, while others were meant as entertainment but include a fair amount of social commentary. There were also, of course, those writings that were pure social commentary, written by social critics who saw the problems within the Church and religious communities as part of a larger problem of a lack of religious devotion within society as a whole. These outright critiques tend to fall later in the period and reflect the growing anger in medieval society at the lack of social mobility and the increasing distrust of the Church, with the practice of selling indulgences in the form of Papal Bullae drawing increasing angry and accusations of simony (Gilchrist and Sloane, 2005, p. 96; Knowles, 1976). Many of the later critics were Lollards, English followers of Wycliffe who were deeply critical of the Church in the 14th century and called for reform of many of its teachings, institutions and practices (Knowles, 1976).

The following poems, stories and writings were selected, partially because they have been translated into English, but mostly because these writings have been identified by a variety of medieval historians as either important works in their own right or as works that encapsulate a larger movement.

11th and 12th centuries

The three examples in this time period are songs or poems in the troubadour tradition and all three of those feature nuns and so will be discussed below.

13th and 14th centuries

Many of the examples in this section use humour to make a commentary on society, specifically that of religious communities. The two main critiques being made are that nuns and monks are both lusty and greedy. These works can probably best be compared to modern political cartoons, where certain attributes are routinely given to certain individuals or parties. The Conservative party is portrayed as out of touch aristocrats and Labour as the striking working classes. Regardless of the reality of the actual background of the individual being shown, these archetypes are recognised and based on people's perception of the history and activities of the parties (Streicher, 1967, p. 443). In many ways these entertaining social commentaries, like political cartoons, can be used as a vehicle for understanding what was the popular perception of monasteries and nunneries. This does not mean, however, that they can be used as a kind of historical opinion poll; these represent one person's opinion (the author) of what they saw as funny and entertaining. They may have been a kind of ludicrous, "over-the-top" observation of humour or they may have been thought of as funny because they were so "off the wall", unrealistic jokes about things that would never happen.

The reoccurrence of the same ideas and jokes, i.e. monks and nuns being greedy and lascivious, suggest that it was something that people found funny, but not necessarily something that they observed every day. The fact that these troupes are found all over Europe only emphasises the point that these were known satires that people were familiar with, in a variety of cultures.

The first example is that of a French troubadour, the second an English collection of short stories, following this are two poems, the first being English and the second Irish. The following three examples are that of an Italian book, an English dialogue, and the famous *Canterbury Tales* by Chaucer. While the average person in England would not necessarily been aware of these specific texts, they are included in this research to illustrate the similarity in this type of social commentary across Europe in the medieval period.

Peire Cardenal (1180-1278) was a French troubadour who wrote a poem characterising different orders (Press, 1971). He claimed that Benedictines were gluttons and kept women, and that the Cistercians were land hungry. Overall he said that the religious (i.e. the clergy) shamed the martyrs' memories with their wicked ways (Press, 1971). These criticisms continue to occur throughout the medieval period and are often believed to have some truth in them. Cistercians did buy and exploit large tracts of land, sometimes forcibly removing the people who had lived there before (Bond, 2004, p. 244). The Benedictine houses tended to be the wealthier houses and, according to Harvey, consumed a large amount of food (Harvey, 2002, p. 70-1). A number of

visitation records have examples of individual monks (and monasteries) being punished because they had relationships with women (Knowles, 1959; Knowles, 1955; Knowles, 1948). In this way, the poem uses strong language and generalisations about things that are known to have happened, but Cardenal suggests that every monk in these orders are guilty of these sins (Press, 1971).

In *The Alphabet of Tales*, a 15th century collection of short stories, there are a number of humorous, allegorical, or homiletic stories in which monks and nuns are punished for their sins or praised for their strength in avoiding them (Banks, 1904). One such story deals with a monk who, having indulged in wearing fancy clothing during his life, is barred from heaven by St Benedict (Banks, 1904, Tale 350). The monk protests and Benedict suggests that they can open him up instead and if they find no meat than he can enter heaven (*ibid.)*. This story of an indulgent monk is both a criticism of the practice of monks eating meat and wearing expensive clothes, as well as a lesson to those who might follow in his footsteps.

The monks in *The Alphabet of Tales*, however, are forgiven for their sins and even vindicated after a harsh punishment, as in Tale 2, indicated that it is important that they have time to rest and 'be merry' as in Tale 6, forced to remain in Purgatory because last rites were not completed (Banks, 1904*,* Tale 17), denied food because of a desire to lead a contemplative rather than a work filled life (Banks, 1904*,* Tale 200), and punished for sleeping during Mass (Banks, 1904*,* Tale 285). The Tales about monks deal less with one specific sin and rather about what the proper life was for a monk. Abbots (and Abbesses), on the other hand, are criticised and mocked for being too strict or greedy (Banks, 1904*,* Tales 2, 5, 8, 9, 14 and 673). They appear to be in control of their own destinies within the *Tales*, while the monks and nuns are often at the whim of their superiors or darker forces.

The poem *The Land of Cokaygne,* written sometime in the mid-14th century, suggests that monks desire to commit every kind of indulgence imaginable (Anonymous, 1995). It is a poem that depicts the monastic heaven, in which an abbey sits nestled in the land of milk and honey, stocked with all the food a monk could eat (Anonymous, 1995). The young monks spend their time, when not saying Mass in a crystal-filled chapel, playing and flying around the grounds, visiting the neighbouring nunnery and bringing home nuns to teach them 'a prayer with legs uplifted thoroughly' (Anonymous, 1995, p. 55). Each monk is granted twelve wives per year and the one best at sleeping is the abbot (Anonymous, 1995). In order to get to this heaven, a great penance must be done, that of wading through pig dung up to one's chin (Anonymous, 1995).

This funny and irreverent picture of heaven suggests a number of things. That monks wish they had more light when saying their masses and that they had more time to play, that they did not have to work so much and that they could sleep all they wanted. In general this is not a bad set of wishes for individuals who were, by their own Rule, only allowed to sleep 5-7 hours per day and spent all

their waking hours either praying, singing mass or working (Knowles, 1959, p. 213). The other set of wishes, however, suggest that perhaps not all monks were thrilled with their vow of chastity, or that the individual who wrote *The Land of Cokaygne* could not imagine how someone could be happy or content with such a vow. The poem does not actually criticise monasteries outright, but rather suggests that the lives of the monks leaves a lot to be desired.

A more outright criticism, although couched in another series of stories, is that of The *Decameron,* a collection of 100 stories written in the mid 14th century, told by a small group of young men and women in order to entertain themselves while they are hiding from the plague by living in the countryside (Boccaccio, 2008). Over ten days, each of the ten individuals tells a story, and a few of these stories involve members of the clergy (*ibid.)*. Many of the stories are funny and make a joke about common stereotypes about monks, nuns and friars; that monks and nuns are lustful and that friars are either stupid or deceitful. In fact, out of the ten stories that feature members of the clergy, only four have religious characters that are described as good people who follow the rules of their order. These individuals are often fighting against less noble members of their profession (Boccaccio, 2008). The rest of the stories featuring the clergy are full of friars out to trick people and nuns and monks having illicit affairs.

It is the friars, however, that seem to bear the brunt of Boccaccio's satire. Not only are they described in introductions as being either stupid or deceitful, but also the stories are used to back up this statement. The three stories described above feature friars who are either used or exploited because they are incapable of working out what is happening. Two particular stories, however, stand out as showing the friars to be especially deceitful. One story, describes a friar tricking a girl into believing that the Archangel Gabriel is in love with her and wants to use his, the friar's, body to have an affair (Boccaccio, 2008). This friar is punished by having to dress up as a goose and parade around the town square (Boccaccio, 2008). The other story, features a man who, after a tremendously sinful life, becomes a friar. This friar then goes on to have an affair with his godson's mother, a relationship considered incestuous at the time (Boccaccio, 2008). When the woman's husband comes close to catching them, she tricks him into believing that the friar had just saved their son's life. They convince him that the friar will need to come back to the house repeatedly to carry out the same ceremony if the boy is to stay alive (Boccaccio, 2008).

These stories, clearly intended to be humorous, poke fun at all parts of society. The way they portray the clergy, however, could suggest some societal views of them. Monks and nuns are described as almost ridiculously lusty, a parody of a perception that may or may not have been based on fact. Friars were either too stupid to notice what was going on around them or conniving and deceitful. The reality is that, when Boccaccio was writing *The Decameron*, there was growing trend of anger directed towards friars, partially due to their perceived lack of adherence to their vows, as well as the protections offered to them by the papal office (Knowles, 1957). In addition to

political and social feelings against friars, many people were unhappy about what they perceived as the wealth of religious institutions that were supposed to have taken vows of poverty (Knowles, 1957; Knowles, 1955).

The *Dialogues* of Fitzralph, written in the 14th century, includes a conversation between a knight and a clerk that deals with this issue (FitzRalph, 1925). In the dialogue, a clerk and a knight are arguing about whether Church laws supersede the laws of the King (FitzRalph, 1925). The knight, unsurprisingly, believes that the King's laws supersede the Church because the Church, as a whole, is supposed to pray virtually continuously, but really spends its time making money. As such, they are not doing what they are supposed to be doing and so their laws are meaningless, ergo they should have to follow the King's law (FitzRalph, 1925). He goes on to suggest that the money made by the Church is being used for 'synfulle dedes and vanite' and not for the charity it should be used for (FitzRalph, 1925, p. 20).

The clerk argues that, if people gave enough money to keep the Church going, they would be able to carry on with the important business of praying. Instead, they have to make their own money just to keep afloat. He argues that the Church's law is God's law and therefore supersedes the King (FitzRalph, 1925). The dialogue ends with no agreement, but with a definite feeling that the clerk is in the wrong. Although not a monk, the clerk is speaking for the whole of the Church, which is being accused of the sin of avarice.

Both the Prioress and the Pardoner in *The Canterbury Tales,* written by Geoffrey Chaucer in the 14th century, are described as having access to large amounts of money. The Clerk and the Monk are clearly educated men and the other travellers are not terribly pleased about their use of language and telling of long winded (even pointless) stories. The Friar and the Summoner argue and tell stories about a bad summoner and friar, respectively. The Shipman's Tale features a monk who, reminiscent of *The Decameron*, tricks his friend's wife out of some money and then goes on to seduce her (Chaucer 1894). The clerk in the Miller's tale also seduces the wife of another man (Chaucer 1894). These stories, like *The Decameron*, are entertaining and funny.

In *Piers Plowman*, written in the 14th century, Langland's outrage at the friars comes through clearly. The other churchmen, priests, and the other members of the clergy, including monks and nuns, seem to disappoint Langland, but did not incur his wrath in the same way as friars. For example, the character Clergy, who is the cousin of Study and married to Scripture, is well read and pedantic, but does not know anything about Dowell, one of the characters for whom Dreamer, the narrator, is looking for 'DoWell,' who, as his name implies, does well (Langland, 2008, p. 91-98). This echoes Boccaccio's stories in which the clergy go through the motions and talk about doing well and leading a good life, but they do not actually know anything about it (see above).

The friars, priests and pardoners, on the other hand, are accused repeatedly of preaching, praying and pardoning for money. Langland accuses them of not teaching people right from wrong, but only caring about getting paid (Langland, 2008, p. 56-65). He says that the friars preach for profit and interpret the gospel as it suits them (*ibid.)*. The priests and pardoners he accuses of stealing money for prayers and favours (Langland, 2008, p. 66-81) and, as far as Langland was concerned, the Church had gone so wrong that it was standing in the way of true salvation.

A similar attack is made on friars in *Jack Upland*, a 14th century commentary on religious houses. It reads as a list of complaints against the Church; priests do not care about their parish or saying Mass, friars are guilty of simony (and just about everything else), no one is obedient to kings or bishops, and prayers are bought and sold, as is the Eucharist (Anonymous, 1968, p. 55-62). After a more general diatribe about the Church, the author launches into an assault specifically focused on friars. It is suggested that they do not observe poverty or vegetarianism, that they live in expensive houses and do not give to the poor as is supposed to be a central tenet of their order (Anonymous, 1968, p. 60-62). The author suggests that friars only visit the wealthy, even though they claim that the poor are worthier (Anonymous, 1968, p. 64). This attack on the friars continues in the same vein and it is unsurprising that it prompted a response.

Friar Daw's Reply, usually included sandwiched between *Jack Upland* and *Upland's Rejoinder*, was supposedly written just after *Jack Upland* by a friar. In it, the author suggests that the writer of *Jack Upland* is not very intelligent and that he does not understand how the world works (Anonymous, 1968, p. 85). He writes that, although some friars are not virtuous, the majority of whom follow their vows and blames the ill feeling towards friars on the Lollards' propaganda (Anonymous, 1968, p. 73). Overall, the *Reply* insists that the accusations in *Upland* are unfair and unfounded, the result of misinformation. He argues that friars try to follow Christ's teachings more than any other group, abandoning wealth and family in order to do so (Anonymous, 1968, p. 90). Some years after the *Reply* was published, *Upland's Rejoinder* was written, which accused 'Friar Daw' of being a liar and a blasphemer (Anonymous, 1968, p. 102). Continuing on from the original *Upland*, the *Rejoinder* suggests that friars spend too much time with women and, backhandedly, of being unchaste and committing sodomy (Anonymous, 1968, p. 103). The author writes that friars are obedient to their own rules, but not to Christ's (Anonymous, 1968, p. 106).

As a trio, *Upland, Reply* and *Rejoinder* clearly illustrate the strength of people's feelings on the matter of Church reform and the perception of the religious at this time. Again, it is not known to what extent the accusations in these writings are true, but show instead the strength of two (possibly three) people's opinions on the matter. The trio was popular and reproduced often enough that it survives, which lends credence to the idea that the public likely enjoyed reading it, although does not indicate what their beliefs about the subject matter.

John Wycliffe made a similarly angry accusation in his treatise *On Simony* published in the late 14th century, possibly reflecting the popularity of the idea. Wycliffe accuses monks of simony, the sin of buying one's way into holy orders, suggesting that they commit it at least three times during the course of their life. The first was when a monk or his family is required to gives a donation for him to enter the monastery, the second when he (and the rest of the monastery) accepts land or money for prayers, and finally at their leaving the monastery to take up a parish or church appropriated by the monastery (Wycliffe, 1992, p. 132-6). He suggests that, given the choice, monasteries would rather take on a rich man than a pious one (Wycliffe, 1992, p. 132).

15th and 16th centuries

Erasmus in his Colloquies, published in 1518, levies a similar charge of simony. He writes, in 'The Religious Banquet', that monks and priests only move into cities to make money, which they then spend on building beautiful monasteries and not on feeding the hungry (Erasmus 1877, p. 82, 100-1). In his colloquy about friars entitled 'Rich Beggars,' an innkeeper compares monks and friars to wolves and pigs in habits, preying on the sheep. One of the other characters reminds the innkeeper not to judge men by their clothing and that, while some monks and friars are like this, not all are (Erasmus 1877, p. 185-6). Once again, a writer is keen to point out that these generalisations that are made about the religious do not apply to all.

The final work explored in this section is that of David Lindsay's *Satire of the Three Estates*, written in about 1540 in Scotland (Lindsay, 1989). In it, the character named Chastity is trying to find a place to stay for the night and none of the religious characters, named for their offices, Prioress, Abbot, Parson, etc., will let her stay with them. Abbot says that he wants as much to do with Chastity as he does with the Queen of the Fairies (Lindsay, 1989, p. 41-45). Lord Spirituality will not lodge with her either, as he does not know her (Lindsay, 1989, p. 44). Chastity accuses them of putting her aside after taking their vows, choosing to live with Sensuality instead (Lindsay, 1989, p. 43). Sensuality, for her part, wants to be sent to live in Rome with the bishops; Lord Spirituality welcomes this idea (Lindsay, 1989, p. 61-2). Chastity begs again with each character and is refused (Lindsay, 1989, p. 123-31).

Overall, Lindsay paints a sad picture of the state of religious institutions in the mid-16th century. As his *Satire* comes just a few years after the Dissolution in England, in the middle of the Protestant Reformation in England but before the real Reformation in Scotland, which was not set into motion until 1552, it is entirely believable that a great many people agreed with his ideas. This is not to say that it is true, simply that it may have been perceived to be true.

Many of the writings of the time suggest anger against friars, accusations of simony and gluttony against monks, and rumours of a general lack of chastity among prioresses/nuns. They show a growing dissatisfaction with the religious institutions, although there is a noted rise in these kinds

of attacks against any type of visible, disposal wealth following the Black Death, believed by some to be the result of the frustration of the masses with seeing a large amount of wealth in the hands of a relatively small percentage of the population (Gilchrist and Sloane, 2005, p. 96; Bynum and Freedman, 2000, p. 12). Unfortunately, there are very few stories and accounts from the point of view of the members of these institutions. The following section will explore two chronicles written by monks, sadly, no such chronicles exist that were written by nuns from this period in England (Bell, 2007, p. 121-3).

The Personal Views of Monks

As with the previous section, it is understood that these are the views and experiences of one individual and may or may not be representative of the whole. Given the time available, only chronicles translated into English could be used, which greatly limited the selection. In the end, only two chronicles have been read and discussed below, Matthew Paris' *Chronica Majora* and Jocelin of Brakelond's *Chronicle of the Abbey of Bury St Edmunds*.

Matthew Paris wrote his chronicle in the mid-13th century during his time at the Benedictine Abbey of St Albans in Hertfordshire, where he was a monk (Paris, 1982). Apart from being very well informed about political and social events throughout Europe, Paris strongly condemns the friars, writing that the Pope sends them out to rob other churches and monasteries for money that they do not have (Paris, 1982, p. 88). He seems very concerned both with his monastery's money and with other people taking said money, and he accuses bishops of only performing visitations in order to make money, echoing the accusations of many critics that both the bishops and friars are "money grabbing" (Paris, 1982, p. 219). Paris also disapproves of the King taking money from churches and religious houses for his crusade, writing that a king would only take money from a religious house if he 'had wholly lost the bowels of compassion' (Paris, 1982, p. 157 and 219). However, he also does not think that the King should take money from the citizens of London either (Paris, 1982, p. 164). Besides money, Paris writes about the shortcomings of the other monastic orders. Much of his anger is focused on the friars but he also appears to dislike the Cistercians. He suggests that Cistercians only got their right to teach at the universities out of vanity and because, if they had not they would have been mocked by the other orders (Paris, 1982, p. 187). He also relates a story designed to shame the Cistercian order of a house in Pontigny, France who tried to embalm the body of a saint in order to ensure that it would be thought of as more saintly (Paris, 1982, p. 213-4). These attacks show a little of the competition and occasional animosity between the different orders.

In Jocelin of Brakelond's *Chronicle*, he discusses the tension that could exist within a monastery. His *Chronicle* begins with a description of the deeds of the abbot of his monastery, Abbot Hugh. Jocelin is unimpressed with Abbot Hugh's business sense, claiming that he (and the badly supervised obidientaries) ran the monastery into a great deal of debt (Jocelin de Brakelond, 1989,

p. 3). The debt was so bad, according to Jocelin, that, if the monks had not lied to the King and visiting bishop, the running of the monastery could have been taken out of the hands of the monks and given to an appointed caretaker (Jocelin de Brakelond, 1989, p. 5). After the death of Abbot Hugh, Jocelin recounts the infighting and politics that occurred during the nomination and election of the new abbot (Jocelin de Brakelond, 1989, p. 9). Even when the new Abbot, Samson, is elected and welcomed back, the politicking did not end and was a real problem for Samson (Jocelin de Brakelond, 1989, p. 30).

Because of the levels of debt and mismanagement supposedly accrued during Hugh's reign, Samson spends most of his abbacy turning the finances of the abbey around and putting a system into place to ensure it does not happen again. He has a charter written up of the lands held by the abbey and a record of the money owed both to, and by, the abbey, in order to keep track of it all and ensure that it is all paid (Jocelin de Brakelond, 1989, p. 30).

There are several indications that the politics within the monastery were quite intense, including a possible attempt on Samson's life (Jocelin de Brakelond, 1989). Shortly after the initiation his programme of debt repayment plan, Samson confiscates the seals of all of the obidientaries, making sure that any payment coming out of their offices is approved by both him and the entire chapter (Jocelin de Brakelond, 1989, p. 35). This was not popular. Following this, Samson wakes in the middle of the night to find a candle left lit in such a way that it would have fallen into some hay had he not woken up and moved it (Jocelin de Brakelond, 1989, p. 29). He also found the windows and door latched firmly so that no one would have been able to leave the abbot's quarters without a key (*ibid.)*. Jocelin does not complain much about this, but it appears that, as a result of the unpopularity of Samson's financial plan, either a monk or layperson intended to kill him. In this way it is obvious that, not only were the finances of a monastery difficult and tricky, the politics of the community could be exceedingly difficult.

This is also true of the politics surrounding the period between Hugh and Samson's abbacies. Jocelin relates some of the gossiping and infighting that took place when a new individual's name was put forward for the office (Jocelin de Brakelond, 1989, p. 11-13). Some individuals were accused of being unintelligent, illiterate or petty, another was discounted based on his speech impediment of which it was remarked that it sounded like his mouth was full of 'dough or pig-feed' when he spoke (Jocelin de Brakelond, 1989, p. 11-13).

These two chronicles reveal communities in which politics, intrigue and pride were commonplace, and suggest that the lives of the monks living within them were not solely taken up with prayer, manuscripts and singing. These were, essentially, very large households and, as such, were troubled with problems of which each individual would have had an opinion. Both Paris and Jocelin were concerned enough about the financial wellbeing of their houses to write about it,

perhaps suggesting the finances of monasteries were known to, at least, all of the obedientaries, and the handling of them may not have always been agreed upon by all. Jocelin writes extensively about the politics within his community, while Paris writes about the shortcomings of other monastic orders. Neither appears to be terribly fond of either the bishops or the King (or other secular powers) interfering in the business of their communities.

Perhaps it is unsurprising that, even with all the disagreements within a community, all within that community can agree that they should be allowed to govern themselves. As for what these chronicles suggest about the quality of life of the average monk, both individuals write primarily about the larger issues, without focusing on the day-to-day lives of the monks. These suggest, to the author, that their basic needs were met. Neither monk writes about the monks in their community going hungry or falling ill because of poor living conditions. Neither writes about abnormally high death rates or illness levels. The levels of illness and death were clearly normal enough that the two men did not take enough notice of them to include them in a chronicle. Jocelin does recount stories in which certain individual monks were described as illiterate, but he does not make a comment about whether or not this was a truthful statement or simple slander. Again, the levels of literacy were normal enough that neither monk took notice of them.

Apostates

Although not written in their own words, records also remain of those monks (and nuns), known as apostates, who were unhappy enough in their house and/or profession to attempt to abandon their vows (Logan, 1996). Logan (1996, p. 69-73) writes that, although the records kept show only 0.91% of the monastic population were recorded as apostate, the percentage is more likely to have been closer to between 3-7% due to the differences in both recording in and survival of administrative documents.

According to Logan (1996, p. 70-71), there appears to be no pattern in relation to the size or wealth of the particular house from apostates are recorded, although he does note that the larger the order the more apostates are recorded. He also notes that there is no one particular reason given for leaving a religious house and that the causes include greed, i.e. actually absconding from the monastery with a large number of goods or money, chastity, although he asserts that this is not as common as a modern reader might expect, disagreements with the ruling prior or abbot, and boredom (Logan, 1996, p. 74-83). He notes that, in over, 200 recorded cases, there is only one mention of heresy, suggesting that crises of faith were not the root cause of many of these departures (Logan, 1996, p. 74).

Upon return, a monk or friar could expect to be welcomed back, as the ultimate goal of capture was the “healing” of the lost sheep, as they were often referred to, and reintegration with the community (Logan, 1996, p. 121-3). They were subjected to punishment and penance, including

being sent to other houses, periods of enforced fasting, public confessions of their desertion, corporal punishment, additional prayers, and some orders were also known to imprison apostates for various periods of time (Logan, 1996, p. 146-53). Whether the low percentage of recorded (and unrecorded) apostates reflects and general satisfaction with the religious life or a fear of these punishments is not known.

(iv) Summary

The Benedictine Rule written by Benedict of Nursia was written to give a monastic community a set of guidelines that gave instructions for the diet, living arrangements, and daily schedule. These instructions could, if followed to the letter, have resulted in reductions in an individual's or group's quality of life.

Although the size of individual monasteries varied considerably, they were the corporations of the medieval world, controlling land and, therefore, wealth. The political power of each could vary, but the combination of the well-known caricature of the fat monk and the research into the diet of individual monasteries suggests that having enough to eat was not a common problem for medieval monasteries. They also lived in substantial buildings that, while they were known for being cold, had some of the best sanitation measures of the time.

The potential education options for a monk were the highest in the medieval world and, although not all monks attended university, their basic level of education was still higher than the average lay person. The resource access and socio-political power of the average monastery was also far higher than average. The social view of monasteries changed over the period in question and, by the end, there were a number of critics who felt that monasteries and friaries had moved away from their religious goals and were taking advantage of their wealth and position in society.

Overall, monasteries appear to have had a high standard of living for their time with strong social, cultural, and political access. They were also thought of as having a unique spiritual position, although there were those who felt that, especially towards the end of the period, this had been abused. In terms of their quality of life, the baseline view would be that monasteries had a higher physical and spiritual quality of life than the average lay person.

2.4.2 Aspects of Life in Female Religious Houses

In her seminal study of English nunneries, Eileen Power concluded that nunneries were primarily used as "dumping grounds" for unmarriageable daughters and troublesome widows (Power, 1922, p. 6). Many later studies of nunneries agree with this belief that most nuns did not choose a religious life (Hager, 1992, p. 393; Thompson, 1991, p. 161; Vickers, 1995, p. 132). Both Bynum and Gilchrist, however, suggest that the surge in nunneries in the 12th and 13th centuries was the result of a large-scale spiritual movement among women (Bynum, 1987, p. 20; Gilchrist, 1994, p.

15).

Bynum (1987, p. 14-5) attributes some of the early increase in female religious fervor to the popularity of wandering preachers who, because of their disapproval of mendicant women, founded nunneries for their female followers. She also notes that, in the 13th century, the popularity of the reform orders was not limited to men and that, although initially refusing all female applicants both the Premonstratensian and the Cistercian orders restricted the number of female houses they supported (*ibid.)*. Another explanation, or at least an influencing factor, is the fundraising efforts of the infamous cleric Abelard in which he claimed that nuns had as much, if not more, influence in their prayers as they "greater influence with Christ than men," reasoning that "who might better approach Christ…than one of his earthly brides?" (Griffiths, 2003, p. 73).

However, whether these women chose the religious life, or it was chosen for them, nuns were expected to be exceedingly moral, even more so than their male counterparts. This is because it was believed that women were inherently more prone to by tempted by evil than men (Cadden, 1993, p. 178-8). For example, poverty was considered to be of great importance to religious houses, and they were expected to fully support themselves and to have no personal possessions. When Saint Francis of Assisi founded the Franciscan Order in Italy, the central tenet was that of poverty. Franciscan friars were expected to beg for their food. However, when Saint Clare attempted to follow his lead, both St Francis and the Pope forbade her to beg. It was thought that begging was a threat to a woman's chastity, considered to be the most important virtue for women (McNamara, 1996, p. 251).

Saint Aelred, an English Cistercian, was also concerned about the morality of women and cautioned anchoresses not to be too candid with their male confessors, as it may be seen as immodest and open their confessor to impure thoughts (McNamara, 1996, p. 247). This is one of the many-recorded worries that the male dominated clergy had about non-virtuous nuns, a common thread in morality texts and satires alike. However, the most common complaints from the visitation records are not of lascivious nuns, but rather of their clothing. It seems that many nuns from wealthy families found it difficult to get rid of their fancy clothes and jewellery (McNamara, 1996, p. 358-9; Power, 1922, p. 305).

It is interesting for the purposes of this study to point out that wearing inappropriate clothing and jewellery was the most common complaint about nunneries in visitation records, while monks were most often chided for overindulgence in food. In a time and culture where having enough food was not only a luxury but also power, gluttony was a major indicator of lust and greed. According to Bynum, medieval thinking regarded the greatest temptations for monks as greed, but vanity for nuns (Bynum, 1987, p. 79).

(i) Implications of Monastic Rule

The same monastic rule used to govern monasteries was also used in nunneries, although advice was written on how it could be adapted to the lives of women, the general format was the same. As such, the implications the Rule had on the quality of life of religious women were the same as that for men (see section 2.4.1 i).

One area where the Benedictine Rule was imposed more strictly on nunneries in comparison to monasteries was the idea of enclosure (Makowski, 1997; Power, 1922, p. 342). The rule states that a monk or a nun should not leave their house without good reason and explicit permission from their supervisor. It was thought, however, that enclosure was more important to religious women because they were in more need of protection to the point that Power (1922, p. 342) refers to enclosure being the fourth vow, following obedience, poverty, and chastity. It was believed that it was only through full enclosure that a nun's virtue and chastity could be guaranteed (Makowski, 1997; Power, 1922, p. 342).

This idea, which became papal law in 1297, not only ensured that religious women were kept within the grounds of their house, but were also unable to manage any business or legal concerns on their own, they had to have male representation to do so (Makowski, 1997). This could have impacted on the quality of life of nuns in that they were unable to engage meaningfully in society and could easily have their finances mishandled.

(ii) Evidence for Standards of Living

Income

In his 1926 study of monastic finances, Snape does raise the on-going concern with simony within nunneries, which he concludes was the result of extreme poverty, in his view, of many of the houses. This may have been the commonly held view of the time, as the 1288 Tax of Pope Nicholas completely excluded many nunneries because their income and rents were so low that it was not worth the effort to tax them (Snape, 1926, p. 150). His estimation of the cost of maintenance for a monk over the centuries rose from 13s 4d in the 12th century to £5 in the 13th, and between £8-10 in the 14th, although of course these estimates would have varied house to house, depending on their wealth (Snape, 1926, p. 166-168).

The nunneries were equally varied, although most historians believe that nunneries were, on average, poorer than their male counterparts (Gilchrist, 1994, p. 90; Thompson, 1991, p. 166; Power, 1922, p. 161). One particularly clear example of this is the foundation of the nunnery of Lambley in Northumberland, which, at the Dissolution, was recorded as having an income of only £5, in between the average of the annual earnings of an unskilled and a skilled labourer (Dyer, 2009, p. 240). This income was to support six nuns, pay taxes, maintain a house considered in 'ruins,' and run a small estate (Bell, 1995, p. 11).

In addition to making less money on average, nunneries were often not allowed to manage their own finances, as discussed above, as it was believed that women were less able than men to manage money. In 1298, Pope Boniface VIII proclaimed that it was the responsibility of bishops to ensure that the nunneries in their see were 'financially stable and tightly cloistered' (Herder, 2005, p. 232). The Bill also stated that nunneries should not take on any new postulates unless they could be afforded, which led to some of the accusations of usury discussed above (Brundage and Makowski, 1994, p. 145).

Additionally, all nunnery business was to be done through a proctor or procurator (Herder, 2005, p. 232; Brundage and Makowski, 1994, p. 146). Herder relates the case in Catalonia, Spain in which the local nunnery was in such bad debt that the bishop put the nuns on food allotments and appointed a procurator (Herder, 2005, p. 233-7). For a period of about 30 years, six different procurators managed the finances of the nunnery, bringing it out of debt (Herder, 2005, p. 238). After 1333, however, the procurators disappear from the records. When they do resurface, approximately four abbesses later, the procurators appear to be subordinate to the abbess, working for her as an advisor or possible clerk (Herder, 2005, p. 238-40). Herder (2005, p. 241) takes this as an example of medieval nuns finding ways for the rules to suit their needs, rather than passively accepting restrictions.

A less optimistic view is taken by Berman with the example of the Cistercian nunnery of la Cour-Notre-Dame-de-Michery in Sens, France that had been 'ravaged' by the Hundred Years War (Berman, 2000). The plan was that the nuns would be removed to another location and in order to support this plan, a collection of charters were created to show that the nunnery was too damaged and ill-managed to be left in the hands of the nuns (Berman, 2000, p. 34). A cartulary was put together, which Berman (2000, p. 37) notes was a rare thing for any religious house except very wealthy ones, and this was used to move the nuns out and into a neighbouring monastery in. Unsurprisingly, the monastery to which the nuns relocated had fairly severe debts and the establishment of a new estate cancelled these debts out (Berman, 2000, p. 42).

This was not unusual, as, 20% of nunneries in the area had already been taken over by monasteries (Berman, 2000, p. 43). In the case of La Cour-Notre-Dame-de-Michery, the Abbess had, several years before, put together a set of accounts, which portrayed the nunnery as being very poor. Berman (2000, p. 58) believes that this was done as a way of tax evasion, as there are no other indications that the nunnery was in fact poor. He takes this as evidence that the Abbess was actually very good at managing and reporting finances, but perhaps very bad at politics (*ibid.)*.

Diet

Food seems to have played an interesting role in the spiritual lives of women in the medieval

period, although in a different way to the monks. Rather than the problem of over-indulgence, nuns may have had the exact opposite problem. Bynum's survey of hagiographic records suggests that food played a more central theme in female saints' lives, through fasting and abnormal eating, than for their male counterparts (Bynum, 1987, p. 189). Many female saints, for example, are recorded as consuming no food other than the Eucharist (communion), and others as intentionally eating scabs from diseased individuals (Bynum, 1987, p. 137-40). Although these are clearly extreme examples, their presence in primarily female hagiographic texts may suggest that food was a strong element in women's faith in medieval Europe. As discussed above, the restriction of calories can have a severe impact on an individual's health and, potentially, life expectancy. However, because of the lack of documentation surviving from nunneries, studies like those described above on Canterbury, Westminster and Durham Cathedrals are not possible.

Living Condition

As discussed above, medieval England had different living standards for women and men, and from available evidence, it would seem that many monasteries had a high quality of life for the time period, living like much of the gentry. In a survey of nunneries in England, Bond found that most nunneries had similar ways of supporting themselves in comparison to monasteries, although many of these holdings were smaller (Bond, 2003, p. 60). He also found that the nunnery churches tended to be smaller and less ornate than those at monasteries (*ibid.)*. This could be interpreted as the nunneries having smaller populations, or that the nunneries had to support themselves on less income per capita than the monasteries. However, Bond concludes that nunneries appear to have been similarly provisioned as the other small-scale religious houses in England (Bond, 2003, p. 75). He does note, however, that sanitation provision appears to be less 'impressive' than male houses, a finding that is supported by Gilchrist's conclusions that nunneries had a reputation as having poor sanitation and lax disposal of domestic refuse (Bond, 2003, p. 74; Gilchrist, 1994, p. 125-6).

Education

Again, as with the section on life expectancy, research is limited in the area of education of nuns due to the scarcity of written records surviving from nunneries. However, the manuscripts that do survive give an impression of libraries that compare favourably to those held by monasteries of the time (Bell, 2007, p. 116). Interestingly, the majority (63%) of the non-liturgical books were written in English, rather than Latin (*ibid.)*.

There is other evidence suggesting that, over the medieval period, English nuns became less fluent in Latin and even French (Bell, 1995, p. 60-4). Power notes that over time, visitation notifications and registers from the bishops to the nuns change from being written in Latin (as was customary for ecclesiastical communication and continued to be used with monks) to using more French. Over time, this changes again to include English explanations until eventually nearly all written

communication to nunneries was in English (Power, 1922, p. 247-9). It was common practice for bishops to send injunctions to both nunneries and monasteries in Latin until 1300, although in the last decades of the 13th century many of these also included versions in French and later in English (Bell, 1995, p. 64). At the nunnery at Farewell in 1331 the bishop was asked to send his correspondence in French by the nuns who complained that they could not understand Latin (Bell, 1995, p. 65). Similarly, the abbess at Elstow asked for correspondence to be sent in English in 1421-22, as did the abbot at Humberstone in 1440 as not all of his monks understood Latin (*ibid.)*.

As discussed above, the standard level of education during the medieval period was, what we now call, the classical education. As the name suggests, this method of education was grounded in being able to read Classical (e.g. Greek and Roman) texts. Without being able to read Latin, nuns would have been unable to even begin such an education. In the 11th and 12th centuries, nuns were expected to read and study the scriptures and the writings of the Church Fathers, just like their male counterparts (Shahar, 2003, p. 50). They were also expected to copy and illuminate books, which would have called for a degree of education (*ibid.)*. During at least one meal of the day, it was customary to have one of the sisters read aloud in Latin (*ibid.)*. Over time, the male teachers that had been made available to nuns were gradually removed. This coincides, it would appear, with the opening of the universities, which took the place of monasteries as the medieval centres of learning (Power, 1922, p. 240). All women, including nuns, were excluded from universities (*ibid.)*.

Generally speaking, medieval women's education primarily centred around at least at this level of society (i.e. merchant and noble) being able to run a household and do fancy needlework (Shahar, 2003, p. 40-43). Nuns were able to add copying and illumination, at least in the wealthier houses, to their daily chores which might have included light housework, embroidery and spinning (Shahar, 2003, p. 44). According to Shahar, in poorer houses, the nuns were responsible for more of the household tasks including the cooking, laundry, spinning and weaving (*ibid.)*. According to the Rule of St Benedict, nuns were also expected to add reading to their list of daily activities (Bell, 1995, p. 42). As with the monks, nuns were given books to read, although while the monks were given the books over the period of Lent, nuns were given the book for a year (*ibid.)*. There are examples of nuns being made to do penance, including laying on the floor of the chapter house for several hours if they did not complete their book (*ibid.)*. This would suggest that, at least at some houses, reading and the ability to read was an important aspect of a nun's life.

Further evidence of this is the existence of what could be called convent schools, the practice of nunneries taking on local and/or noble children in order to educate them. Power estimates that roughly two-thirds of nunneries accepted children, both boys and girls. Although she notes that the largest number of children reported is twenty-six, convent education was not widespread (Power, 1922, p. 264). Many of the children, predominantly girls, appear to have been the children of the aristocracy and the wealthy (Power, 1922, p. 266). The education provided probably included

memorising various prayers in Latin, possibly learning some French, basic reading, singing, spinning, needlework, possibly cooking and home medicine (Power, 1922, p. 276-8).

Power doubts that the children were taught to write, as she suspects that many of the nuns were themselves unable to do so. She also writes that 'sober medieval opinion [did not] consider it wholly desirable that girls should know how to write' (Power, 1922, p. 277). Overall, the girls sent for an education at a nunnery were given an education in what was considered to be important for their sex at the time. Power would suggest that this was the extent of the education for nuns too (Power, 1922, p. 277). Both Bell and Shahar appear to believe that the education of nuns was a bit higher than that of the average noble or gentlewoman (Shahar, 2003, p. 44; Bell, 1995, p. 40-44). All agree, however, that the education of the average nun was not at as high a level as for the average monk.

In terms of quality of life, this would indicate that, in education, nuns had a lower quality of life than monks, but a higher quality of life than the average lay woman. This study is about comparing the quality of life of monks and nuns within the world they were expected to function. Both groups were expected to be able to carry out specific religious tasks and it was felt that those with an administrative responsibility should be able to carry out the additional tasks associated with running a large estate. As such, the ability to read and/or write would have been an important aspect of the quality of life of the group, if not the individual.

Access to Resources

Foundational reasons were also very different for nunneries. Monasteries were founded as chantries, places where the religious living there would pray for a particular individual (and their family). Nunneries had chantries, but they were usually founded as part of someone's dowry, or so that the female members of a family could have somewhere to live either after the death of their husband, or if they could not find a husband. This meant that the original endowment of nunneries was often smaller than that of monasteries, which would have impeded their efforts to remain self-sufficient (Gilchrist, 1994, p. 90). These efforts may have been further hampered by the kinds of land granted to nunneries, which McNamara believes was of lesser value than that granted to monasteries (McNamara, 1996, p. 264). This land was often uncleared and far away from the main estate. This was a problem as it was considered dangerous for nuns to run their own granges and so they had to rely on hiring help to do so (McNamara, 1996, p. 266). Nunneries were also required to have a monastery as a guardian, a task most monasteries were loath to provide (McNamara, 1996, p. 271; Brundage and Makowski, 1994, p. 146).

Life Expectancy

Keeping found, in her study of monasteries and nunneries, that the life expectancy of females buried at either monasteries or nunneries was statistically similar to that of the males (Keeping,

2000, p. 142). The females buried in the nunnery were living longer than females buried in the parish cemetery, but not as long as females buried in the monasteries, although these differences were not statistically significant (Keeping, 2000, p. 143-4). This suggests that nuns may have had similar life expectancies as monks, which were only about as long as the other females within the population.

However, Gilchrist and Sloane (2005, p. 204) note that while the mortality peak for the two nunneries in their study (the same two as in Keeping's and two of the four in this study – Clementhorpe Priory, York and Elstow Abbey, Bedford) was in the same region as for the males of the community (30-39 and, 20-29 respectively), there are more older women being buried at all sites, including the Jewish cemetery at York and the secular women buried at the Augustinian Priory at Hull (also used in this study).

At these two nunnery sites, 34% (Elstow) and 25% (Clementhorpe) of the female cemetery population were over 50 years old at death (*ibid.)*. When compared with the cemetery population's percentage of males over 50 at three monastic sites, including Westminster Abbey (30%), St Mary Merton, Surrey (25%) and St Mary Graces, London (20%), although not conclusive, it suggests that older women were buried at nunneries than older men at monasteries (Gilchrist and Sloane, 2005, p. 208). They suggest that this is either because female monasticism allowed for greater longevity or that more widows favoured a monastic burial (Gilchrist and Sloane, 2005, p. 204).

Keeping (2000, p. 199), in her analysis of the kinds of disease seen in monks and nuns concluded that males in monasteries were more prone to diseases and conditions relating to stress throughout their lives, while females at nunneries were more likely to suffer from diseases and conditions relating to advanced age. It should be noted, however that, on average, even in the medieval period, women tend and tended to live longer than men, as has already been discussed.

When taken together, this information may suggest that nuns were potentially living longer than monks in medieval religious houses. Whether this was due to differences in health, diet, living conditions or a genetic predisposition is not and possibly will never be known.

(iii) Popular Notions and Critiques of Lifestyle

As with the above section on the portrayal of monks in popular culture, the following section will explore the ways in which nuns were portrayed in medieval contemporary writings.

11th and 12th centuries

As mentioned above, the examples found for this time period are examples of troubadour songs and feature nuns. Troubadours were travelling poets and minstrels, although they were occasionally attached to a particular individual or court (Butterfield, 2002, p. 1). They were the comedians and

popular musicians of the medieval world and were especially popular in France during the 12th and 13th centuries (*ibid.)*. The aristocracy and wealthy merchant classes would have been aware of their work due to both a shared cross-Channel culture on the part of the aristocracy and the frequency of travelling or being in business with other travelling merchants on the part of the wealthier members of the merchant class (Paterson, 1995, p. 159). As many, but certainly not all, monks and nuns were born and possibly raised in these types of households, it is possible that they were aware of these pieces of entertainment. All three examples within this theme feature nuns.

A common theme among troubadour poetry is the idea of courtly love, defined as a type of affair carried out within the court and abiding by its rules. These affairs followed the pattern and etiquette required by decency and chivalry, as defined by the aristocracy (Schultz, 2006). Many of these poems and songs used religious imagery to describe the parties involved and their feelings towards each other (Gaunt, 2006). The troubadour, William IX, who lived between 1071-1126, in an unnamed song compares his beloved to a nun because he is unable to be alone with her (Press, 1971). In his song, William IX uses the common example of a nun to exemplify the difficulty the singer faces in being able to be alone with his love, i.e. impossible (Press, 1971).

The second example is that of Bel e Doette, written in the 12th century, also using the idea of a nunnery to convey a sense of loss. In this poem, a woman's 'friend' is in another land, competing in a tournament and dies while jousting (Anonymous, 1988a). Out of grief, she puts on a hair shirt and becomes a nun (*ibid.)*. She goes on to open up an abbey that will serve as a home for men and women who have suffered because of love and wish to retreat from the world (*ibid.)*. This is a perfect example of another aspect of medieval courtly love or romance, the overwhelming sense of grief at the loss of an individual's beloved and the overly dramatic retreat from the world because of it. Once again the author uses the idea of religious community as a metaphor for a problem with their perfect romance, this time the death of the other individual rather than their difficulty in reaching them. This again shows the idea of the medieval religious community, specifically the nunnery, as a place far away from normal society, a place of solace and retreat.

A final example of a piece of entertainment that uses a member of the religious community is an anonymous poem written between 850 and 1300 in Latin called 'Lament of a Nun' (Anonymous, 1988b). This poem centres on a nun, described as 'lusty' and 'lascivious,' who is unsatisfied with her vocation and wants a man (Anonymous, 1988b). This nun carries on with her work; she rings the bells and sings the psalms, but is constantly thinking of how much she wants a man in her bed (*ibid.)*. This is an example that fits into a different type of medieval sexual fantasy, specifically that of lusty nuns. There are a number of works that use this same idea that will be discussed in the next section, as they feature some form of social commentary. This example, however, shows the nun carrying on with her work and not indulging in her desires and fantasies (Anonymous, 1988b), and it serves more as a male fantasy of a woman in a state of suppressed sexual frenzy, locked away

from all men.

This fixation on the sexuality of nuns is a common theme found throughout the medieval period.

13th and 14th centuries

An example of this theme is found in the poem *The Land of Cokaynge,* discussed above, once again returns to the idea of chastity (or the lack thereof) in nuns. The monks, during their almost limitless free time, are known to visit to neighbouring nunnery, described as being near a river of milk and having great quantities of silk. The monks, seeing the nuns swimming naked in a nearby river, bring some of the nuns home to have sex with them (Anonymous, 1995, p. 55).

This fixation on the chastity, or lack thereof, of nuns is also found in *The Decameron*. One particularly story involves a man, described as handsome and muscular, who pretends to be a deaf mute in order to get a job at a nunnery (Boccaccio, 2008). Two of the nuns are curious and think that they are tricking him into having sex with them. Eventually, he ends up having affairs with all of the nuns and the Abbess (Boccaccio, 2008). He finally has to reveal to the Abbess that he is not a deaf mute because he is so tired from all the sex he's been having. The Abbess does not want to allow him to leave, so she claims that he has been miraculously healed, keeps him on as the nunnery's steward, and essentially works out a rota to ensure he does not get quite so tired (Boccaccio, 2008). The story ends with the wry comment that he lives out his days at the nunnery and fathers many little monks and nuns (*ibid.)*.

In the poem 'Why I can't be a nun,' nuns are guilty of virtually every sin imaginable. It is a poem written from the view of a girl in her mid- to late-teens that wants to join a nunnery (Wilhelm1990). Her father, however, having done some research into nunneries, does not believe them to be a place for a respectable woman. The girl is distraught and cries for days, until one night she has a vision, shown to her by Experience, of a nunnery that is inhabited by anthropomorphised vices, i.e. Dames Pride, Sloth, Envy, Lust, Wantonness, etc. (Wilhelm1990). Experience tells the girl that this is how nunneries are in every district, save a few scattered, pious nunneries (*ibid.)*. The girl decides that she no longer wants to be a nun and that, as long as she is virtuous in her attire and behaviour, people will know that she is holy, even without the veil and wimple (*ibid.)*. This poem suggests first that nunneries in the 14th century may not have been viewed as places of piety, but also that a daughter should respect her father's decision because it will be the right one. It is a poem criticising the behaviour of nuns as well as warning children, specifically girls, to do as they're told. The nuns in the vision are undisciplined and full of sin, and the virtues expected of women, meekness and devotion, are not mentioned.

Other lessons suggested by the book would have been more difficult to put into practice, such as the story of a prince who falls in love with a beautiful nun (Banks, 1904*,* Tale 136). She refuses to

give up her vow and so he sends some of his men in to drag her out. The nun, instead of going with them, cuts out her own eyes and gives them to the men to deliver to the prince. He does not come for her again and her eyes grow back within a year (*ibid.)*. In this story, the prince is not punished for his actions and the nun is only saved when she commits a gruesome sacrifice. This would suggest that the belief that the chastity of nuns being both a matter of great importance and sanctity was still alive and well in the 13th century.

Other stories of nuns include those of nuns and abbesses being tempted by the outside world and/or the devil. In some, the nun is protected through her prayers, and in others she succumbs. Sometimes, she is forgiven and welcomed back, while in others she is damned for her misdeeds (see Banks, 1904 13, 468 and 470). Clearly, the chastity of nuns was a difficult and complicated issue, which may explain why it was such a popular topic.

The sin of greed, as mentioned above, is found to be attributed to Abbesses and Abbots (as well as priors and prioresses) rather than the lowlier monks and nuns. In *The Alphabet of Tales,* one of the tales, number 15, features a conversation between a flea and the disease gout. The two try to decide which bed they would rather sleep in, that of a poor woman or an abbess (Banks, 1904*,* Tale 15). Gout decides that it would rather sleep with the abbess and the flea would rather sleep with the poor woman because it suits each better. The gout is wrapped up in warm and soft sheets by the abbess, but plunged into cold water by the poor woman. The flea is hunted down by the abbess and her maidens, but ignored by the poor woman (Banks, 1904*,* Tale 15) This has been taken by many to suggest that an abbess would have a richer diet and more comfortable surroundings than a peasant.

This is seen again in the example of Chaucer's Prioress, who is explained to be of high birth and described as wearing an expensive rosary and religious ring (Chaucer 1894 158-62). Unlike the other stories from this time, however, the prioress and the nun in Chaucer's tale do not fit the lusty or greedy caricatures described above. Both tell religious stories, saints' lives specifically, when their turns come, as does the Nun's Priest (Chaucer 1894). Chaucer may have been alone in his view of the pious, if wealthy, nuns or, more likely, the bawdy stories were more popular and have survived because of this entertainment value.

15th and 16th centuries

In the final part of the period covered by research, while there are a number of stories and critiques features monks and friars, nuns appear to have receded slightly from the public eye. In Lindsay's *Three Estates*, however, the Prioress does claim that Chastity does not agree with her, and that she's bad for her complexion. She goes on to admit that she thinks that nuns are useless and that marriage is a better religion than being a friar or a nun (Lindsay, 1989, p. 123-31).

Apostates

According to Logan (1996, p. 78), although proportionally nuns were recorded as running away in order to break their vow of chastity more often than monks, this accounts for less than 20 recorded instances. This would suggest that the obsession with chastity, or the lack there of, in nuns was not necessarily supported by real events. Logan (1996, p. 84) suggests that this is because of the impossibility for many women to hide the fact of their lapse, i.e. pregnancy. He goes on to write that:

> "No male religious [monk], no matter how flagrant and repeated his transgressions would ever be so publically exposed to the scorn and contempt of society [as a pregnant nun]." (Logan, 1996, p. 84)

Aside from the need for the nun in question to carry and deliver a baby, the reasons for running away and the punishment for doing so were largely similarly to monks, including boredom, internal disputes, thievery, etc., with one exception: abduction (Logan, 1996, p. 84). Abduction was used to refer to any instance when a nun was, with or without her consent, taken away from her nunnery by another individual (Logan, 1996, p. 85). The result was not simply punishment for the nun in question, if the abduction was with her consent, but also for the abductor, whether or not they had the nun's consent (*ibid.)*. This punishment was delivered by both the ecclesiastical court, usually three years imprisonment and a fine to the house, but also by the secular court, in the form of a fine paid to the crown (Logan, 1996, p. 86). Logan deduces this to be the result of the belief that any apostate was a "grave scandal" to the wider public (Logan, 1996, p. 143); presumably, interfering with a nun was seen as a greater scandal and threat to public belief.

(iv) Summary

A prominent theme in the proceeding discussion is that of the importance that was attached to the idea of the chastity of nuns in the medieval mind. The strict enclosure of nuns, both physically and socially, was considered so important that it because papal law. The combination of both ecclesiastical and secular punishment for contributing to a nun breaking her enclosure suggests that this was considered almost a moral taboo. These women were not supposed to leave their nunneries and were severely restricted in their financial, political, and social interactions. When combined with reduced foundation endowments and lower average on-going contributions, it is not surprising that nunneries are considered to have been, on average, poorer than their male counterparts.

This would have had an impact on their physical quality of life through reduced diet and access to resources. There is also the accepted belief that the sanitation measures in nunneries were, on average, not as advanced as those in monasteries.

Their education was also impacted by the idea of enclosure, as it was not possible for nuns to attend university. That being said, however, the likelihood that many nuns could read, even if they could only read English or French, gave them a higher education than many in the lay population.

Being largely unable to participate in legal and political discussions, however, does mitigate the social, if not personal or spiritual, applications of such an education.

The focus on the chastity of nuns is also evident in popular writings throughout the period in question, with nuns being both the butt of increasingly bawdy humour, but later also being accused of not observing this particular vow.

Overall, it would appear that, while having a higher standard of living than the average lay person, nuns likely did not, on average, achieve as high a standard of living as monks. Their social and political power, as well as education, can be deduced to have occupied a similar middle ground. Their spiritual contribution was also thought to rate somewhere below that of their male counterparts. This forms a picture of a higher physical and spiritual quality of life than the average lay person, but lower than that of monks.

2.5 Defining medieval QoL

Modern quality of life studies have access to a wide range of evidence, including national statistics and questionnaires. They explore questions relating to the access people have to wealth and other resources, including intangible resources like education, their expectation of living at a reasonable standard of living to a reasonable age, and their own personal views of how their life is going. In order to gain access to this type of information, archaeologists and historians have to use a variety of different evidence and piece together information in order to explore the differences in access to resources, life expectancy, and socio-cultural beliefs.

This information will never be a direct comparison to modern quality of life studies and any conclusions drawn must be firmly placed within the cultural and historical framework of the location and period of the community in question. In terms of the medieval period, this means that both the physical and the spiritual aspects of quality of life must be explored.

Medieval physical quality of life, measured in terms of access to land and resources, income, education, diet, living conditions, and life expectancy, could vary dramatically between the different demographic groups. The disparity between the aristocracy and common people was vast, with both monasteries and nunneries appearing on all points in that spectrum. Individuals living in monasteries, according to academic research, appear to have had, on average, a higher physical quality of life than individuals living in nunneries, although the goal of this research will be to explore this conclusion and to assess what other factors would have influenced the quality of life of these individuals.

In terms of spiritual quality of life, the medieval belief that suffering was good for the soul may have meant that those individuals living in a community with lower physical quality of life

believed that they had a higher spiritual quality of life. Ideally speaking, this would have been the goal of these institutions, but practically speaking, it is impossible to know where the emphasis would have been in each individual's mind.

The following chapter will outline the sites and methods that will be used in this research project to explore these differences between the quality of life, both physical and spiritual, of the individuals who lived in medieval monastic institutions in England.

Chapter 3: Materials and Methods

3.1 Introduction

The late medieval period in England was a time and place of both great change and continuity. Technological innovations were developed that improved agricultural production and revolutionised warfare (Gimpel, 1976). New economic, political and religious ideas were developed and fought over. England at this time was a feudal country with strict laws against social mobility, but which nevertheless saw great societal and cultural movement throughout the period (Platt, 1978). The Church held great power, both religious and political, throughout Europe (Saul, 1997). In fact, the Church is believed to have held more land in England than the King, in a time where land was a great source of wealth and power (Bond, 2004, p. 12). Monasteries, nunneries, friaries, nunneries and other monastic communities controlled much of this land (*ibid.)*.

A wealth of archaeological material in many forms has been recovered from these houses, but only three types of data will be used in this research project: contemporary texts, artefacts, and human remains. These were selected based, in part because of the past experience of the research, but also because it was felt that they reflect key aspects of the individual and group's quality of life. Human remains were used to assess those aspects of quality of life relating to diet, environmental conditions, and limited lifestyle information. Artefacts were selected to access both access to resources and wealth, but also important activities, including agricultural work, crafts and manufacturing, and reading and writing. The documentary sources were included in the hopes of establishing more concrete information relating to income, access to wealth, and a limited sense of socio-economic power.

This chapter will outline the methods used to interrogate this data in order to answer the research aims laid out in Chapter 1:

- To consider the validity or suitability of the phrase "quality of life" (QoL) when studying the lives of archaeological populations
- To explore the differences, if any, between the quality of life of the inhabitants of different monastic groups according to gender (nunneries and monasteries).
- To detect any inequality in the QoL between northern and southern houses, urban and rural sites and between orders (older and reform orders).

The first section of this chapter will describe the archaeological sites identified for use in this research, followed by an exploration of the methods used by the original examiners in the original reports regarding the skeletal remains and a description of the health indicators used to assess the health of the monastic communities. A discussion of the artefact class and documentary sources

will follow, ending in a brief overview of the database and statistical methods used in analysing the data as a whole.

3.2 Identifying Sites

An important factor in a study of this nature is that the two groups being compared share as many similar characteristics as possible, so that any difference found can be discussed in relation to only a handful of factors. However, archaeology does not lend itself to these kinds of perfect conditions but, by controlling for location and foundation order, a start can be made to explore QoL differences between male and female monastic houses. In order to make the two groups, i.e. people living in monasteries and nunneries, as comparable as possible, the sites used were chosen first based on whether the necessary resources were available for study, but then on two location criteria and into what order they were founded. The goal was to have two northern and two southern houses representing monasteries and nunneries, resulting in a total of eight sites. One of the northern houses would be rural and the other urban, the same for the southern houses. The plan was also to have one of the northern houses as representing Benedictine or other older foundation, and the other one of the reform orders. Again, the same was required for the southern sites.

Each of these criteria is discussed below, including the problems with adhering to each and the steps taken to resolve these problems. The eight sites identified for this study are Clementhorpe Priory, York; Elstow Abbey, Bedford; Hull Austin Friars, Hull; St Andrew's Priory Fishergate, York; St James Priory, Bristol; St Mary's Abbey (Nunnaminster), Winchester; Sinningthwaite Priory, Bilton-in-Ainsty; Hulton Abbey, Stoke-on-Trent (Figure 3.1 and Table 3).

Table 3.1: Sites Identified for Study

House	*Male / Female*	*Order*	*Location*	*North / South*	*No of Indiv*	*References*
St Andrew's Priory Fishergate, York, North Yorkshire	Male	Gilbertine	Urban	North	391	Stroud 1986 Stroud and Kemp 1993 Kemp 1996
Austin Friars, Hull, East Yorkshire	Male	Augustinian Friar	Urban	North	249	Evans ND Evans 1998 Holst 1998 Isaac 1998
St James' Priory, Bristol, Avon	Male	Benedictine	Urban	South	243	Jackson 2006 Loe 1988
Hulton Abbey, Stoke-on-Trent, Staffordshire	Male	Cistercian	Rural	South	87	Browne 2004 Klemperer, 2004 Browne 1994
Sinningthwaite Priory, Bilton-in-Ainsty, North Yorkshire	Female	Cistercian	Rural	North	130	Holst 2009 MGA 2009
Clementhorpe Priory, York, North Yorkshire	Female	Benedictine	Urban	North	151	Brinklow 1977 Dawes 1976-7 YAT 1976-7
Elstow Abbey, Bedford, Bedfordshire	Female	Benedictine	Rural	South	45	Baker, 2012 Baker 1971 Baker 1969 Baker ND Stirling ND
St Mary's (Nunnaminster), Winchester, Hampshire	Female	Benedictine	Urban	South	39	Browne 1986 WMS 1981-3 WMS 1973

The areas excavated and the available chronology of the burials associated with each of the sites is given in Appendix C, along with a brief history of each house. Unfortunately, because of the lack of a specific chronology of burials at many of the sites, it was not possible to compare the changes in quality of life over time. The period of 1066-1536 was used as a single unit, as discussed in Chapter 1, with the understanding that this 500 year period was one of huge social, economic, and political change and that this research project suffers for not being able to focus further in on those inevitable changes in quality of life that would have occurred over the course of the later medieval period.

3.2.1 Location

Identifying sites based on location was achieved; two northern and two southern nunneries were found with sufficiently high numbers of individuals in the cemeteries to make them worth studying. However, although the urban and rural distribution worked well for the nunneries, the only northern monasteries found with large cemetery collections were both urban; a possible reflection of the fact that most excavations in England take place in urban areas, in advance of modern

development (Crabtree, 1990, p. 161). In fact, both the southern rural houses in this study, Elstow Abbey and Hulton Abbey, although considered rural in their time, are now on the outskirts of more urban areas. Both the northern male monasteries were urban, because no rural sites were identified with large enough skeletal collections. Hull Austin Friars and St Andrew's Priory also both belonged to reform orders.

3.2.2 Founding Order

In terms of founding order, historical reality had a large part to play in that most reform orders did not recognise, found or support nunneries until the 13th century AD (Thompson, 1991, p. 94). Only one nunnery in this study is listed as belonging to one of the reform orders, Sinningthwaite Priory but, according to Thompson, it was never formally recognised as Cistercian by the order or the Pope (Thompson, 1991, p. 107). Gilchrist and Sloane record the other three nunneries as belonging to the Benedictine order, although Gilchrist considers Clementhorpe mendicant in an earlier publication (Gilchrist and Sloane, 2005, Gilchrist, 1994, p. 40). For the purposes of this study, however, all the nunneries except Sinningthwaite were considered Benedictine. No southern Cistercian nunneries have been excavated with human remains.

The "male" sites also posed problems, in that no older orders were identified in the North with cemetery collections. As such, both Hull Austin Friars and St Andrew Fishergate, York were used instead, although both were urban. In fact, the only criteria that were not compromised were the sex of the community, and the region.

3.2.3 North v South

The male sites, overall, were relatively straightforward to identify in terms of location, although there were a few small problems with organising access to data. The female sites, however, were more difficult. By reviewing the appendix in Gilchrist and Sloane (2005), it was relatively easy to select nunneries that had associated cemeteries as well identify the number of individuals recovered from these cemeteries. This identified three sites, Elstow Abbey, Nunnaminster and Clementhorpe. Sinningthwaite Priory, however, was excavated after the publication of Gilchrist and Sloane (2005), but the individual carrying out the skeletal analysis was known to Durham University staff and the assemblage was identified for this research.

Finding southern sites with associated skeletal collections was not a problem initially, although accessing the archives was challenging. David Baker very kindly sent the skeletal archive for Elstow Abbey, saving both time and money. Neither of the inventories of St James, Bristol and Nunnaminster, Winchester were with the original archive, but both Kate Iles and Helen Rees were able to provide the information. The fourth southern site was originally intended to be the abbey of Stratford Langthorne but, upon inspection of the archive, the inventory was missing. Unfortunately,

it was never found, even with the extraordinary efforts of Jelena Bekvalac at the Museum of London. A different site, Hulton Abbey, was therefore identified and, being published, the artefact catalogue and site plans were easily accessed. The skeletal records were also very kindly sent by Sue Brown.

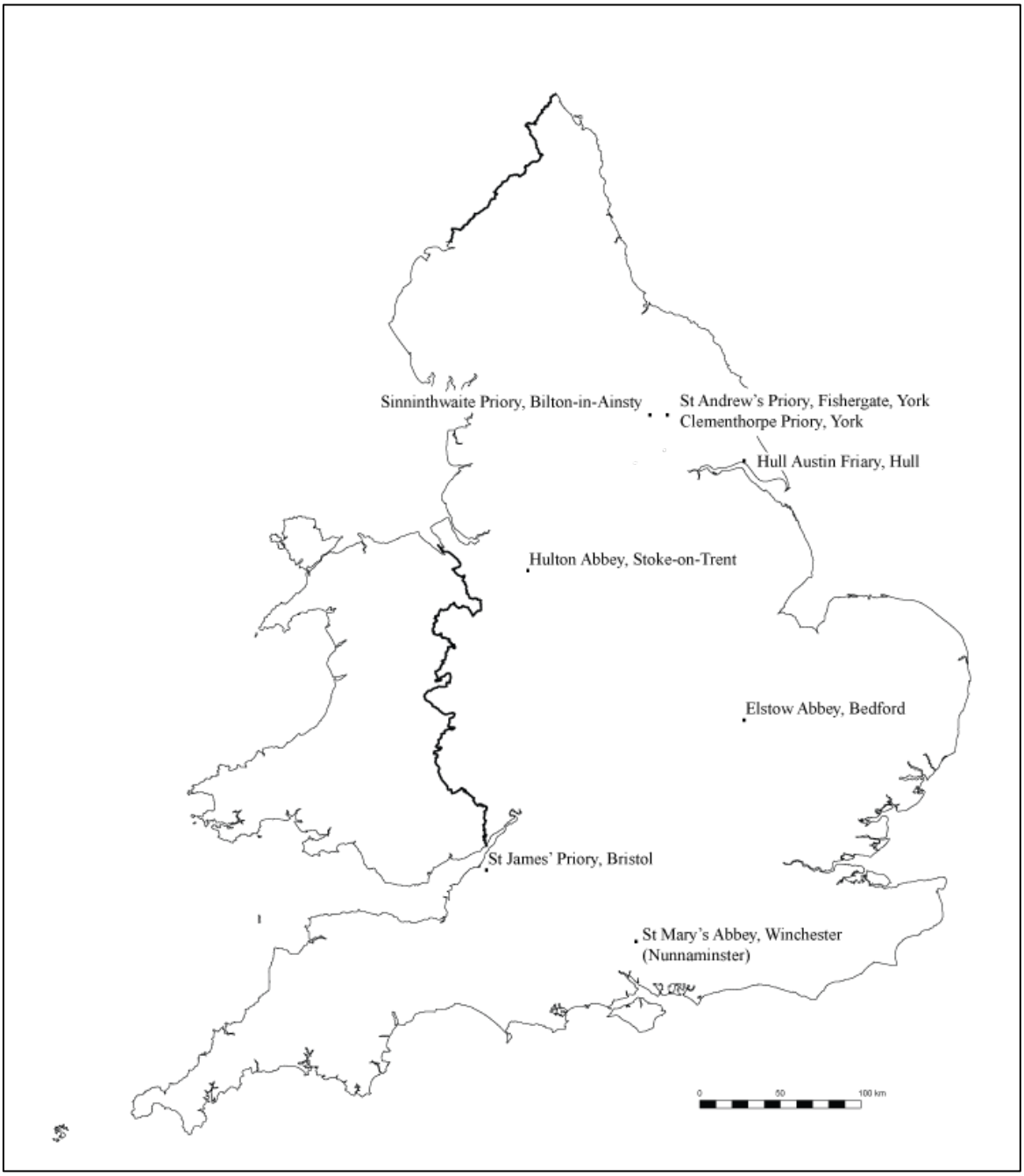


Figure 3.1 Map of sites. Template courtesy of the Ordinance Survey, copyright 1999.

3.2.4 Availability of Archaeological and Historical Material

The most important criteria used to identify sites for this study was the actual availability of the relevant archaeological materials. Because so few sites have large skeletal collections, this was the first criterion used to assess potential sites for inclusion. As mentioned above, the appendix in Gilchrist and Sloane (2005) was invaluable, in the absence of a national database of museum and

services' collections.

The actual preservation and availability of archaeological material is, of course, dependant on a number of factors, including the chemical make-up of the soil in which it was deposited (Gordon and Buisktra, 1981). Anaerobic soil, i.e. soil with little to no oxygen, will preserve organic material very well, as will waterlogged soil (Roberts, 2009, p. 6-7). For example, the site on which the Hull Austin Friary was excavated was waterlogged and, as such, a large number of leather shoes were preserved (Evans, 1998, p. 59). The method of excavation can also affect the make-up of the artefact assemblage and the recovery of the smaller bones of the skeleton (Gordon, 1993). The size of the mesh on the sieves used to sieve soil will substantially affect the recovery of smaller artefacts and the smaller elements of the human skeleton, especially for juvenile skeletons (Roberts, 2009, p. 78-9). The use of a wet sieve will also improve the recovery of seeds and the remains of smaller animals, including rodents and birds (Hunter and Gassner, 1998).

It was not possible to select sites for inclusion in this research project based on the above factors. Roberts recommends a mesh of 1-2mm for soil samples to ensure no teeth or small bones are missed; it is unknown how large the sieves used (if any) were at the various excavations (2009, p. 79). However, as only the dental health indicators were based on the smaller elements (teeth) of the skeleton and animal remains were not included in the analysis, many of these factors were, if not fully negated, lessened in their influence. The impact of the soil composition could also not be negated, as this would have prevented any comparative studies being carried out.

(i) Skeletal Collection

The original idea was to use only sites with 90+ individuals. As there are only a handful of nunnery cemetery populations available, this was lowered so that both Elstow Abbey and Nunnaminster could be included, as both have only approximately 40 individuals that could be used for this study. Because of time and budget constraints for this project, it was decided to use data from the completed skeletal recording forms for each site, rather then carrying out the skeletal examinations. This decision allowed for the inclusion of more sites than would have be feasible if each individual skeleton had to be recorded during the three-year timeline for this project. The advantage of this is that a full eight sites, with data from a total of 1336 skeletons, could be included, making the statistical analysis and resulting conclusions far more realistic and representative. However, the use of data generated by many different people is not without its drawbacks.

The main problem associated with using other people's recording forms and reports is inter- and intra-observer error. Another problem is that several different methods for age and sex estimation can be used, which can vary widely in both the elements used and the reliability of the method itself (Roberts, 2009, p. 141-2). The specific problems with each of the methods used in this study

are discussed below in Section 3.3. Inter-observer error is the error that occurs between (at least) two people when measuring or assessing anything but, in this case human remains. This means that if two people assessed the same individual, they may find a different age, sex or pathological assessment. Intra-observer error is the difference in measurements or opinions formed by the same person when they revisit a particular sample or individual skeleton multiple times. This means that if a person assessed a particular individual on one day, they may form a different conclusion if they examined that individual on a different day.

For the purposes of this study, the 1336 individuals were assessed by at least eight bioarchaeologists, using six methods for assessing juvenile age, eleven methods for assessing adult age and six for assessing sex. While this may appear potentially considerable error, because of the scale of the study it was unavoidable. The methods used at each site were reviewed and it was determined that all were reasonably comparable and would not affect the research aims or conclusions made.

(ii) Artefact Assemblage

The artefact assemblage, defined in this research as the registered finds, not including bulk potter, ceramic building material, or architectural fragments, was second in selection to the skeletal collection. As discussed above, the relative rarity of human remains at monastic sites, specifically nunneries, meant that sites had to be first selected based on the availability of a cemetery populations. In most cases, this was not a problem and the artefact assemblage of most of the sites was a reasonable size. St James, Bristol, however, has a very small assemblage for the priory period, comprised only of six artefacts. Because of the inherent difficulties in finding another southern, urban male monastic house of one of the older orders with a large skeletal collection, it was decided use the site anyway. Although the conclusions based on the artefact assemblage for St James alone would be severely limited, when combined with the other southern, male, urban and older order sites, the goal of this research was not about examining and drawing conclusions about the sites as singular entities. The goal was to identify differences between types of sites, i.e. male or female, urban or rural, etc. It was decided that the artefact assemblages were suitably large enough overall to be able to perform statistical analysis and draw conclusions.

(iii) Documents

The primary sources for the documents associated with the sites in this study were the *Valor Ecclesiasticus* and the *Monasticon Anglicanum* (Dugdale and Dodsworth, 1970; Record Commission 1894). In the absence of any cartularies, these two collections provided information about the foundation of each house as well as events in its life. They also provided the financial details about each house at the Dissolution, including the assessed value at Dissolution and the pensions granted to the religious. Much of the history of the sites was taken from the *Victoria*

County Histories, as well as any other publications about the sites.

3.3 Methods for Assessing Health using Human Remains

This section explores the methods used to assess health and quality of life from the skeletal remains. The importance of demographic information is first discussed and the ways it is used in this study. Following the discussion on the various methods used to assess age and sex of the skeletal remains, an overview of the health indicators chosen is given. It is important to note that the researchers who originally analysed these skeletal individuals would have used what they each felt were the best methods available to them at the time they were working.

3.3.1 Demography

In addition to the identification and analysis of health indicators discussed below, the demographic "make up" for each site is determined. This entails recording the age at death and sex for each individual. Although the communities were created to be single sex, people from the surrounding areas, and those involved in some way with the monasteries and nunneries, were often buried in the cemeteries (Gilchrist and Sloane, 2005, p. 32). As there was no strict rule about where monks or nuns were to be buried within the precinct, it would be impossible to discern the lay people from the religious. Gilchrist and Sloane (2005) discuss trends in burial patterns but, given the variation in these trends and the fact that none of the sites were total excavations, identifying the monastic communities from the civilian communities is impossible. For these reasons, the entire skeletal population from each site is incorporated into this study. The nunnery and monastery sites are compared first as a whole, and then all the males from each site are compared to each other, and the same for the females. This information is then used to create a demographic profile for each site, which allows the determination of life expectancy and survivorship, or the probability that an individual would reach a specific age (Chamberlain, 2006).

The age groups used for the purposes of this research are 0-2, 2-6, 6-10, 10-17, 17-25, 25-35, 35-45, and 45+. Age is typically given as a range in bioarchaeology as the ageing process affects everyone differently with an individual's genetic make-up and their environment will have an effect on how their body ages (Roberts, 200, p. 126). There are also two groups, Juvenile and Adult, which are used when the age of an individual was not clear. There is an overlap in the age groups and this is because they are a compromise between the various age designations giving by the different researchers for the different sites. Skeletal individuals are assigned as a range of possible ages and most fit in nicely to the ranges put forward in this research. A few individuals straddled two age groups and were therefore assigned the age group to which their original range most closely correlated. For example, if an individual was original given the age range 5-8 they were assigned to the 6-10 group as their original range is more closely aligned to this group. If an individual's age was perfectly split between two groups, for example 5-7, they were assigned the

higher age range.

(i) Age and Sex estimation Methods

This section explores the benefits and disadvantages of using the particular methods that were utilised to assess the age and sex of each individual for the sites. First the various ageing methods used on juvenile individuals are discussed, following by the sexing and ageing methods used on the adult individuals. There are no reliable sex estimation methods for juveniles outside of aDNA analysis, which was not employed for any of these sites. Unfortunately, due to funding problems at the time of the original analysis, the bioarchaeologist Ann Stirland did not leave any record of which methods she used to assess the age and sex of the individuals of Elstow Abbey (D Baker, pers comm 27 July 2012). However, it is unlikely that she would have used a method not described below, given her knowledge of the field of bioarchaeology.

In order to develop accurate ageing and sexing methods, researchers use skeletal collections made up of individuals with a known age and sex. Before going into detail on each method, an overview of the history and general characteristics of two of the most commonly used collections will be outlined here. These collections include the Terry Collection and the Hamann-Todd Collection.

The Hamann-Todd Collection was started in 1912, when T.W. Todd began to preserve the skeletons of the cadavers that were used in the Western Reserve University's School of Medicine (CMNH, 2000). Carl Hamann had worked to improve the medical school's collection during his time as a professor at the university. After being made dean of the WRU's School of Medicine, he supported Todd in his efforts to further expand the collection (*ibid.)*. By 1938, Todd, with the support of Hamann, had collected over 3000 individuals, with records of their age and sex, making it 'the largest, modern, documented human skeletal collection in the world' (*ibid.)*. It was transferred to the Cleveland Museum of Natural History in the 1950s and 60s (*ibid.)*.

The collection is made up of Americans from the first half of the 20th century (CMNH, 2011). It wasn't until the middle of the 20th century that permission of the family had to be given for an individual to be used in medical studies, which had an impact on the number of individuals who could be included in medical school's cadaver and skeletal teaching collections (Hunt, 2011). This could mean that many of the individuals in the Todd-Hamann Collection were people whose families could not afford a burial and so representative of a particular social and economic class.

The Terry Collection was, like the Todd-Hamann Collection, originally put together in the early 20th century (Hunt, 2011). It was started by Robert J Terry using the cadavers from Washington University's medical school, where he was a professor of anatomy (*ibid.)*. His efforts were also constrained by the change in law mentioned above, but not completely halted. Terry continued to

add to the collection, using only individuals whose family gave consent for their inclusion (Hunt, 2011). In 1941, following Terry's retirement, Mildred Trotter took over the responsibility of it and focused her efforts on normalising the demography of the collection, ensuring that younger individuals and white females were included in the collection (Hunt, 2011). The Terry Collection was moved to the Smithsonian in 1967 and is now made up of 1728 individuals (*ibid.)*. The demography of the Terry Collection, while fairly equal, still contains more males than females and few individuals under the age of 20 or over the age of 70. This could mean that any method developed using it could have a bias towards males and be less reliable for individuals under, 20 or over 70 years.

These two of the most commonly used research collections used when developing new ageing or sexing methods. It is important to remember that these collections do not represent individuals from the same historical period as those the method is being used on. This means that it is only known to work on that particular population, but bioarchaeologists use the methods on archaeological populations from different parts of the world and over a variety of time periods. It is unknown (and often unknowable) how these populations differ from each other in their development and morphology. However, these collections and others like them represent the only way of testing an ageing or sexing method. The following section will detail the ageing and sexing methods used to assess the populations included in this research.

Before exploring the methods themselves, however, the question of comparability must be addressed. The wide range of methods used on the skeletal remains included in this research brings with it a problem. Were an individual skeleton to be assessed using each of these methods, the age of the individual could vary considerably and there is the possibility of disagreement in the determination of the sex.

In terms of age assessment, the use of age ranges that largely correspond with one or more of most of the age ranges used in the methods discussed below helped to overcome the issue of comparability between different methods. Furthermore, the "Adult" category to describe any individual of questionable age or for whom there were not sufficient elements present to assess age helped to overcome areas where disagreement would have been likely.

Similarly, the grouping together of ?male with male and ?female with female allowed for the most liberal application of the sexing methods, with a view that this would go part of the way towards making the various methods more comparable. Additionally, the use of the Unknown sex category was applied when the original researcher applied it or when it was determined that there were not sufficient elements present to allow the reliable sexing of an individual.

Adult Sexing

The most reliable methods for determining sex from skeletal remains involve the use of the pelvis, followed by the skull. All of the sites in this study were assessed along these lines, although the St James, Bristol population was also subjected to measurement of the femoral and humeral heads, as recommended in Ferenbach et al.1980.

The other methods used on the St James Priory population, as well as the Hull Austin Friar population, are outlined by Bass (1987). The population at St James's Priory was also assessed by methods in Brothwell, 1981, as were the populations at Hulton, Nunnaminster and St Andrew's. The St Andrew's' population was additionally assessed using Phenice (1969) which uses three features of the innominate bone. A similar method was used on the Clementhorpe population, one developed by Ullrich (1975). Dawes also used a method by Brothwell to assess the sex of the skulls in the Clementhorpe population, from a 1972 edition of the same book that was republished in 1981. The population at Sinningthwaite was assessed on criteria laid out in Buikstra and Ubelaker (1994) using the skull, pelvic and a few other characteristics, as well as measurements.

(a) Ferembach et al.(1980)

The methods outlined within the WEA guidelines cautiously suggest using differences in size and overall robustness to identify individuals of different sex (WEA, 1980, p. 525). The WEA only included methods that were statistically significant during the testing process (*ibid.)*.

The problems associated with these methods are that they rely primarily on the idea that males are generally larger and more robust than females (Bass, 1987, p. 26; WEA, 1980, p. 525-6). Although this idea ignores the issue of the high degree of morphological variability, both within and between populations, it continues to appear in articles attempting to devise sexing methods based primarily on the difference in size between the sexes (Cowal and Pastor, 2008; Işcan and Miller-Shaivitz, 1984).

(b) Bass (1987)

As with the guidelines developed by the WEA in 1980 outlined above, the methods used for assessing adult sex in skeletal remains in Bass's 1987 book *Human Osteology* are an overview of the most effective methods. He discusses three important areas, long bone length and robustness, skull and pelvic morphology (Bass, 1987).

Bass mentions long bone length and robustness, Bass mentions as a possible, if not terribly reliable, method for assessing sex. The methods suggested vary little from the ones recommended by Ferembach et al.(1980) and come with the same caveats about the reliability of such broad generalisations about sexual dimorphism in humans (Bass, 1987, p. 26; Ferenbach et al.1980, p.

525-6). Bass also outlines the various methods and criteria that are used in assessing sex using the skull and the pelvis. As with the long bones, the general thrust of the sexing methods using the skull rely on the idea that the male skull is larger and more robust (Bass, 1987, p. 85). A set of eleven specific landmarks or criteria are also outlined by Bass (1987, p. 86), with both the female and male characteristics described and, for some, drawn. Bass (1987, p. 208-18) admits that the pelvis is the best area to use when assessing sex and outlines a number of useful methods. These include the subpubic angle, the features of the attachment of the arcuate ligament (Phenice, 1969: ventral arc, subpubic concavity, medial aspect of the ischiopubic ramus), the sciatic notch, and the preauricular sulcis (Bass, 1987, p. 208-210). He also includes some features that he describes as having 'minor value' in assessing sex: the general robustness of the innominate, the size and shape of the orturator foramen, the relatively larger pelvic basin in the female pelvis and the relatively larger acetabulum in males (Bass, 1987, p. 215).

(c) Brothwell (1972, p. 1980)

Brothwell covers various methods for sexing human remains, including those using the vertebral column, sternum, clavicle, scapula and measurements of the long bones, as well as the more standard skull and pelvis methods. The vertebral, sternal, clavicle, scapula and long bone methods primarily rely on males being overall more robust than females (Brothwell, 1980, p. 61). To a large extent, the methods using the skull rely on a similar idea (Bothwell, 1981, p. 60). The pelvic methods outlined by Brothwell include the wider sciatic notch in females, the absence of the pre-auricular sulcus in males and the wider sub-pubic angle in females, among a variety of other indicators (Brothwell, 1980, p. 62).

The idea that the male skeleton (and male physiology overall) is generally more robust than females is one that persists in quite a lot of bioarchaeological publications (Roberts and Manchester, 2005, p. 32). The problem with relying on this is that the overlap between the sexes both within and between populations can be very great (*ibid.)*. The methods Brothwell discussed were developed by a number of researchers, many of which have been adapted by later researchers and included in Buikstra and Ubelaker (1994) and Brickley and McKinley (2004).

(d) Phenice (1969)

Phenice (1969, p. 298) used 275 adult individuals of known sex from the Robert J. Terry Skeletal Collection to develop his method for determining sex using specific landmarks on the pelvis, specifically the ventral arc, the sub-pubic concavity and the medial aspect of the ischio-pubic ramus. He found a success rate of between 94-100%, depending on the "race" and sex of the individual (*ibid.)*. With these success rates, Phenice suggests that as long as a researcher is familiar with the population being studied, these methods should be effective. However, he does caution that if the researcher is unfamiliar with the population, the results may not be quite as accurate

(Phenice, 1969, p. 300).

The three landmarks used for this method are not equally effective, with the ventral arc being the least likely to be ambiguous and the medial aspect of the ischio-pubic ramus is the most (Phenice, 1969, p. 300). A test of the method performed, 20 years later by Lovell (1989, p. 119) found the accuracy to be closer to 83% and that it could be heavily affected by the age of the individual. However, the method is still seen as being reliable and was included in the Buikstra and Ubelaker (1994, p. 17; 1989, p. 119).

(e) Ullrich (1975)

Using a collection made up of 77 individuals from a late Slavic cemetery, Ullrich tested methods devised by a number of different researchers, including Putschar (1931) and Stewart (1957), which look at features on various areas in the pelvic girdle for evidence of pregnancy and birth (Ullrich, 1975, p. 25-5). While not specifically a method for establishing the sex of a skeletonised individual, Dawes (1980, p. 23; unpub. Clementhorpe report, 4) used the method as an aid in identifying females within the Clementhorpe population. Ullrich cautions that, although the presence of the pregnancy markers can identify females 'with certainty,' the absence of the markers does not necessarily indicate that the individual was male, only that they were not pregnant or gave birth (1975, p. 34).

Cox and Scott (1992, p. 438) tested the features with 94 females from the Spitalfields site and found no significant association of pregnancy and "parturition scars" with a known sample, i.e. with females known to have been or not been pregnant. However, Dawes (1980, p. 23) indicates that she only used three pelvic characteristics (the shape of the greater sciatic notch, the size of the ischial tuberosities and the presence or absence of the pre-auricular sulcus) to determine sex, noting that it was only occasionally possible to determine if a woman had been pregnant. However, the first and last features are still commonly used to assess sex in bioarchaeological studies today, but oarturition scars can actually occur in male pelves (Buikstra and Ubelaker, 1994, p. 18-19).

(f) Buikstra and Ubelaker (1994)

This collection of methods for studying human remains was developed as a result of a conference in which the lack of an agreed upon set of methodological standards within the field of biological anthropology/archaeology was noted (Buikstra and Ubelaker, 1994, p. 3). It is a guide on data collection and analysis, including the above methods, as well as those for recording pathological changes, cultural modifications, and for conservation of skeletal individuals (Buisktra and Ubelaker, 1994). The guide has been used as a starting point for subsequent reports attempting to standardise methods in bioarchaeology (Roberts, 2009, p. 107).

The methods described were the generally agreed best methods within the field of bioarchaeology and anthropology at the time of publication; many of which are still considered to be the most reliable methods almost two decades after publication. It was also an attempt to ensure that the skeletal material being repatriated to Native American tribes and/or reburied was recorded in such a way that future researchers would be able to reference and utilise the paper records of reburied individuals (Brickley and McKinley, 2004, p. 5; Buikstra and Ubelaker, 1994, p. 2).

Adult Ageing

Establishing an age at death for adult skeletons is far more complicated than it is for juveniles, because it has to rely on markers on senescence or age-related deterioration of particular joints surfaces or other areas of the skeleton, and everybody ages at different rates. Most of the methods used on the individuals in this research relied on changes in the pubic symphyseal joint (where the two pubic bones of the pelvis meet), the auricular surface (where the two innominate or hip bones join the sacrum or base of spine), or the gradually wearing away of the dental enamel, known as dental attrition. Other methods used, although not relied on heavily, were ones involving looking at degeneration of the vertebrae, the rates of cranial suture closure and the degeneration of the rib ends.

The methods used for assessing the pubic symphysis include the Brooks and Suchey method (1990), used on the Hull, St James's and St Andrew's populations, and the Meindl et al.(1985) method, which was also used on the St Andrews population. The Clementhorpe individuals were assessed using the pubic symphyses, using a method set out by McKern and Stewart in 1957. The individuals at Sinningthwaite were assessed using a combination of the Todd (1921), Brooks and Suchey (1990), McKern and Stewart (1957) and Gilbert and McKern (1973) methods.

The auricular surfaces were assessed by methods outlined in Lovejoy et al., on the Sinningthwaite, St James, St Andrews and Hull individuals. Brothwell and Miles developed the methods used for assessing dental attrition. Brothwell's method was used at Clementhorpe, Nunnaminster, Hulton, St James's, St Andrew's, Sinningthwaite and Hull. Miles' method was also used at both Sinningthwaite and St Andrew's.

The populations at St Andrew's, Sinningthwaite St James's, Hull, Hulton, Nunnaminster and Clementhorpe were assessed on their rates of cranial suture closure, as a component of age estimation. With the exception of Clementhorpe, all were assessed using a method developed by Meindl and Lovejoy (1985). Dawes used a method developed by Todd and Lyon (1924) on the Clementhorpe individuals. These methods, however, were not relied on heavily, most likely because of the suspicion of many bioarchaeologists that suture closure is too variable to be used accurately for ageing (Hershkovitz et al.1997, p. 394-5). The Sinningthwaite, Hull and St Andrews'

populations were also aged using the degeneration of the sternal rib ends, a method developed by Işcan et al. (1984, p. 1985)

(a) Todd (1921)

Todd developed a 10 phase method for assessing age based on changes in the pubic symphysis using the known age population that later became the Hamann-Todd Collection, Cleveland, Ohio (Todd, 1921). He developed the method on white males, because that was the largest subsection of the collection, but he tested it on black males, white females and black females to assess whether the changes differed between different ethnicities or the sexes (*ibid.)*. Todd found that there was no difference in ageing phases between the "races", but that females were slightly delayed on two of the phases, resulting in higher age limits for females in those phases (Todd, 1921, p. 37-9). The differences, as far as Todd was concerned, were not enough to rule out using this method on females (Todd, 1921, p. 63).

The ten phases that Todd developed allow ages for individuals to be estimated between 18 and 50+ years (Todd, 1921, p. 1-2). The first five phases (18-30) have small ranges of only one to three years. The second five phases (30-50+) have ranges of five years, with the exception of the final phase, or 50+ category (*ibid.)*. In later research, Meindl et al.(1985, p. 33), modified this method and made the first five phases of it into a single phase, arguing that the differences described by Todd were not large enough to warrant five separate phases.

(b) McKern and Stewart (1957)

McKern and Stewart wrote a report, published in 1957, outlining suitable methods for assessing the age of skeletal material. The report describes the Todd Method, but suggests that it doesn't allow for any variability in the appearance of features of the pubic symphysis (McKern and Stewart, 1957, p. 72). They recommend that, instead of 10 age phases in which each feature is described, each feature should have its own age phases which can then be compared (*ibid.)*.

McKern and Stewart (1957, p. 74-80) define three features of the pubic symphysis, the dorsal plateau, the ventral rampart and the symphyseal rim, giving each six stages (0-5) that represent the age ranges. After examining and giving an age to each feature separately, these ages are then essentially averaged (within a weighted formula) to give an age for that individual (McKern and Stewart, 1957, p. 83-5). They argue that this method allows for variation within a single feature that can still result in giving an accurate age (*ibid.)*.

McKern and Stewart do not give an outline of the population they used to develop this method or any indication of the statistical success of it. They did test the method by asking 'several observers' to use the method on ten individuals and wrote that they had be able to age the individuals

accurately 90% of the time (McKern and Stewart, 1957, p. 82).

(c) Gilbert and McKern (1973)

The method outlined in this article was intended to be used in conjunction with the McKern and Stewart method discussed above. Gilbert and McKern (1973, p. 31) wrote that the McKern and Stewart method, while reliable for ageing the male pelvis, is not reliable for ageing the female pelvis. However, they argued that the McKern and Stewart method, even with this shortcoming, was more reliable than the Todd Method, which they argue consistently over ages individuals (*ibid.)*.

They use a similar approach to McKern and Stewart, reducing Todd's ten phases (nine features) to three features, each with its own six phases (Gilbert and McKern, 1973, p. 32-33). The method was developed using 180 known individuals, 140 of whom were known to have children (*ibid.)*. They agree with Todd in developing the method, that it is not possible to assess the number of pregnancies a woman had or whether parity has a large impact of the morphology of the pubic symphysis (Gilbert and McKern, 1973, p. 37; Todd, 1920, p. 63).

The method results in a formula, as with McKern and Stewart, that gives a score that relates to an age range. The ranges overlap the higher the age goes as to the size of the standard deviations also increase with age (Gilbert and McKern, 1973, p. 34-5). They wrote that, given these large standard deviations, it is clear that the method needed development, but that the differences in the ageing process on the pubic symphysis between the sexes are significant enough to warrant having two separate methods (*ibid.)*.

(d) Meindl et al.(1985)

The Meindl et al. (1985, p. 3) study used the Hamann-Todd Collection in order to test and modify the older method of ageing the pubic symphysis, the Todd Method0). The testing was performed blind, meaning that the individuals scoring the pubic symphyses did not know the age of the individual while they were doing the scoring (Meindl et al.1985, p. 30). Compared to other similar tests, Meindl et al. (1985, p. 32) found that their modified test had the smallest inaccuracy margins. They also tested the differences between the inaccuracy margins for the white and black individuals and found that the differences were not significant. This was taken to mean that the method could be reliably used on all races and over a wide ranging time period (Meindl et al.1985, p. 33).

The phase system developed by Meindl et al., like the original Todd Method, has 10 phases, although the former interprets the first 5 phases as one group, the 'prepiphyseal' group, and ages them at 20-29. The observed age range for these phases was 18-37 (Meindl et al.1985, p. 36). The highest 3 phases were also treated as virtually one group, the 'predegenerative and degenerative'

group, being roughly aged at 40+years (Meindl et al.1985, p. 43). The two groups in between these, phases 5 and 6 or groups 'active epiphyseal' and immediate postepiphyseal,' are the age ranges 30-35 and 36-40 years (Meindl et al.1985, p. 40).

The main problem with this method is that it does not distinguish between the different characteristics affected by sex, seen in the later Brooks and Suchey (1990) method. There is only one group of photographs and these are made up of both males and females. Later studies have found that there is a significant difference between the ageing processes of males and females (Brooks and Suchey, 1990, p. 232).

(e) Brooks and Suchey 1990

The Brooks and Suchey study used a collection of 1225 individuals from the Los Angeles county Medical Examiner's Office (i.e. 'forensic'), with an age range of 14-99 years. The ages were established using both birth and death certificates (Brooks and Suchey, 1990, p. 228). As with the Meindl et al.(1985) study, the Brooks and Suchey (1990) method modifies the Todd (1920) method, reducing the 10 phases to 6. One of the differences between this method and other methods, however is that the Brooks and Suchey method use plaster casts of examples of each of the age groups in order to aid identification, but the biggest difference between the two methods is the separation of the males and females in the Brooks and Suchey method (Brooks and Suchey, 1990, p. 229). The separation means that it is necessary to establish the sex of the individual before attempting ageing, but does allow for the differences inherent in the pubic morphology between the sexes (Brooks and Suchey, 1990, p. 232).

As with the Meindl et al.study, the higher the phase, the less accurate the method. The 95% confidence interval for the final phase is 34-86 years for males and 42-87 years for females, effectively rendering the older phases as no more than 30+ or 40+. This is exactly what Brooks and Suchey (1990, p. 237) recommend, acknowledging the limitations of their method. Even with this limitation, this method is recommended, along with the Todd (1920) method, in Buikstra and Ubelaker (1994:23-4), considered by many to be a collection of the best methods for use in bioarchaeology and forensic anthropology.

The use of forensic cases can be very useful for comparison with archaeological individuals because the individuals in forensic cases will have known sex and age in most cases, and possibly associated medical records. This allows for comparison and possible identification of pathological conditions, as seen in the similarity between lesions found on an individual with no associated medical records from the Coimbra skeletal collection, a 20th century collection, and another individual donated to the National Institute of Legal Medicine in Coimbra, Portugal (Pinheiro et al.2004). The forensic individual was diagnosed by the forensic pathologist as having a vascular

condition, which caused lesions on her left tibia and fibula (Pinheiro et al.2004, p. 138). The individual from the early 20th century collection had similar lesions and it was suggested that these might have been caused by a similar vascular condition (Pinheiro et al.2004, p. 142). Although not completely conclusive in this case, it illustrates the importance of using medical or forensic data for comparison with bioarchaeologocal data.

(f) Lovejoy et al.(1985)

This method for determining age at death using the auricular surface was developed using the Hamann-Todd Collection, an archaeological skeletal collection held at Libben (Lovejoy et al.1977), as well as several forensic cases from the Cuyahoga County Coroner's Office (Lovejoy et al.1985, p. 15). They decided to develop this method because, in their experience, the auricular surface was more likely to be preserved archaeologically than the pubic symphysis (Lovejoy et al.1985, p. 16). The method was developed using 250 from the Libben Collections and the 14 forensic cases. It was tested using two samples from a possible 500 individuals from the Todd Collection, one of 98 individuals and the other of 108. These were blind tests (Lovejoy et al.1985, p. 17).

The method assesses the presence or absence of granularity, microporosity, billowing, striations, transverse organisation, changes to the edge or apex and the retroauricular area (Lovejoy et al.1985, p. 18-19). Using these criteria Lovejoy et al. (1985, p. 27) came up with 8 phases, 20-24, 25-29, p. 30-34, 35-39, 40-44, 45-49, 50-59 and 60+ years. They also include a number of pictures as examples of the different criteria, although the usefulness of these pictures is debatable. The range of inaccuracy is between 7-10 years for most of the ages tested, with the exception of the 18-29 age range where the inaccuracy is just above 3 years (*ibid.)*. The correlation, however, was fairly high, between 0.79 to 0.81 (with 1.0 being a perfect correlation and 0.0 being no correlation).

The Todd Collection, as discussed previously, is a known age collection made up of Americans from the beginning of the 20th century (CMNH, 2011). The Libben Collection is archaeological and not a known age collection. The Libben site, Ohio, USA, was inhabited from AD 800 to 100 and made up of 1327 individuals (Lovejoy et al.1977, p. 291). The excavation was very thorough and the researchers used a combination of the best ageing methods known at the time, keeping only articulated individuals (Lovejoy et al.1977). That being said, the ages and sexes of these individuals were estimated, making its use as a comparative collection difficult.

(g) Brothwell (1981)

The primary challenge for using dental attrition for ageing is that modern, soft foods do not cause the kinds of wear patterns seen in archaeological remains (Brothwell, 1981, p. 71). As such, the method developed by Brothwell used Neolithic and Medieval British skulls in order to assess how

the wear patterns on tooth enamel vary over an individual's lifetime (Brothwell, 1981, p. 72). However, the rate at which people's teeth wear will depend on the relative coarseness of their diet. This method resulted in four age groups, 17-25, 25-35, 35-45 and 45+ years. The 17-25 age group is defined by only slight wear or polishing on the first two molars with the possibility that the third molar may not have yet erupted. Each subsequent age group is typified by increasing wear and exposure of the dentine, with the 45+ age group being expected to have the highest wear (Brothwell, 1981, p. 72). The primary problem with the Brothwell method is that it was not developed using a known age population. As mentioned above, Brothwell himself notes that this is a problem, but not one that is easily overcome.

(h) Miles (1963)

This method, very much a precursor to the Brothwell method above, uses the rate of dental attrition to assess the age at death of an individual. Using 190 individuals from an Anglo-Saxon cemetery in Leicester, England, Miles explored the wear patterns of younger individuals, those whose dentition was not fully developed and therefore more easily aged (Miles, 1963, p. 198). By looking at the wear patterns on the first two molars before the third molar fully erupted, Miles developed an estimated rate of wear (*ibid.)*. He then extrapolated that wear rate to estimate the ages of the older individuals in the collection (*ibid.)*. The chart developed gave pictorial representations of wear for each of the molars with an assigned age with the view that each molar should be aged separately and then the three ages combined to form an estimated age at death (Miles, 1963, p. 204).

As with the Brothwell study, the Miles method relies on data from archaeological dentitions, rather than a known age collection. Similar reasons are given for the need to use archaeological material. Miles (1963, p. 205-7) also noted that his population, when compared with a modern (1960s) population, had a peak in age much earlier, at 35-40 years rather than 75-80 years. He suggests that this may be the result of a shorter average lifespan, poor preservation of the remains of older individuals or that the cemetery represents only a small subset of the population, perhaps a warrior group who died young (Miles, 1963, p. 207). This resulted in a lack of information on his chart of the wear patterns expected in those above 50 years of age, which would affect ages estimated by any researcher using this method, and possibly result in the under-ageing of older individuals.

(i) Meindl and Lovejoy (1985)

The method defined here for assessing age at death using the state of cranial suture closure is the method recommended by Buikstra and Ubelaker, although both they and the original authors advice that it should only be used when there are no other options available (Buikstra and Ubelaker, 1994, p. 32; Meindl and Lovejoy, 1985, p. 65). This method uses 1 cm "lengths" of cranial sutures at very specific sites, identifying 17 in total, but recommending only 10 sites as viable for use in ageing (Meindl and Lovejoy, 1985, p. 58).

The Hamann-Todd Collection was again used to develop this method, bringing with it all of the problems detailed above. In addition to these problems, Hershkovitz et al. (1997, p. 398), when testing the methods, found that a skull with completely obliterated sutures had as much probability for being placed in the age category 25-35 or 35-45. They assert that the rate of suture closure is an 'age-independent, sexually based phenomenon' (*ibid.)*. Meindl and Lovejoy (1985, p. 61), for that matter, found only a 0.51 correlation between their scoring and the actual age of the individual (1.0 is a perfect correlation and 0.0 is no correlation). Their confidence intervals are between 20 and 30 years from the youngest to the oldest age group (Meindl and Lovejoy, 1985, p. 63).

(j) Todd and Lyon (1924)

A method for ageing a skeleton using cranial suture closure that predates the Meindl and Lovejoy method is the Todd and Lyon method, which was used to assess the age of the individuals at Clementhorpe. It was developed on 517 crania that were part of what would become the Hamann-Todd Collection (Todd and Lyon, 1924, p. 330). The method was developed using 307 skulls of white males and then tested for the effects of sex and ethnicities using a remaining mix of 210 white females, black males and black females (*ibid.)*.

They developed a five step rating system with 0 being no union of the sutures and 4 being complete union (Todd and Lyon, 1924, p. 331). Each suture, both internal and external, was assess separately, resulting in a pattern of closure that the authors compared to age, sex, race, cephalic index and cranial capacity. Todd and Lyon (1924, p. 333) found that only age had a high correlation with the rate of closure. The table produced for assessing the age of an individual gives the beginning of suture closure age range followed by a description of when closure will slow down and when closure should be complete (Todd and Lyon, 1924, p. 378). This leads to a complicated table that the authors admit can only narrow the age of any individual down to a rough decade (Todd and Lyon, 1924, p. 379). They advise that suture closure should only be used in conjunction with methods using the rest of the skeleton (Todd and Lyon, 1924, p. 380).

One of the problems with the study was that each age category is not represented equally and that there were far more individuals in the older age groups (50-84) than the younger (18-35) (Todd and Lyon, 1924, p. 345). The method has many of the same problems that have been discussed above, in that suture closure is notably unreliable (Hershkovitz et al.1997, p. 398).

(k) Işcan et al.(1984, p. 1985)

Işcan et al. (1984, p. 1095) developed this method of determining age at death using the sternal end of the fourth rib based on a collection of 118 white males from the Broward County Medical Examiner's Office, only individuals over the age of 17 were included. Nine phases were identified,

with Phase 0 representing those under the age of 17, based on the degeneration of the sternal rib end over time (Işcan et al.1984, p. 1096). The research group went on to publish the method for ageing females based on the fourth rib the following year (Işcan et al.1985). This method was found to be fairly effective, with the largest 95% confidence interval being only 13 years, the rest were between 2 and 10 years (Işcan et al.1984, p. 1097). Each phase is described and has pictures as well as plaster casts of examples of the different age groups in order to help with the identification.

The issues with using forensic collections have already been discussed above, as have those associated with preservation. This method, however, has a further concern, that without a full rib cage, it can be difficult to identify the fourth rib. This results in researchers using a rib other than the fourth, reducing the accuracy of the method. However, Russell et al. (1993, p. 61) suggest that through careful excavation methods, the fourth rib could be isolated at the time of excavation.

Juvenile Ageing

The two primary methods for establishing age at death in juveniles are through dental development or eruption, long bone length and epiphyseal fusion. Dental development or eruption refers to the known ages at which certain teeth develop and erupt. Epiphyseal fusion refers to the known ages at which the ends (epiphyses) of the bones fuse onto the main parts of the bone elements.

There were three dental eruption charts used for ageing juveniles at the sites studied, one published in 1981 by Brothwell and the other in 1989 by Ubelaker. Hulton, Nunnaminster and Hull Austin Friars used the Brothwell chart, while St James Priory and St Andrews used the Ubelaker chart. The third chart, published in *Gray's Anatomy (1958)*, was used by Jean Dawes for the Clementhorpe collection.

An additional method was employed at both Clementhorpe and St Andrews, although two different methods were used. The method uses the length of the long bone shafts to assess age, through comparison with a known age collection, as is standard practice with most methods. The Clementhorpe individuals were assessed using the method outlined in *Gray's Anatomy* (1958), while the St Andrews individuals by a method developed by the Workshop of European Anthropologists in 1980.

The other age at death method for juveniles was observation of epiphyseal fusion. As for dental development, several different methods were used for the different sites. In *Gray's Anatomy* there is, alongside the dental development, a guide for assessing age by epiphyseal union, which was used on the Clementhorpe individuals. The Hull, Nunnaminster and Hulton skeletons were assessed using the methods outlined by Molleson (1986), while the St James individuals were

assessed using a mix of two methods, one agreed upon by the Workshop of European Archaeologists (1980) and the other published in *Gray's Anatomy* (1993). The guide used on the St Andrews individuals was published in *Gray's Anatomy* (1980). The juvenile individuals found at Sinningthwaite were assessed using the methods outlaid in Scheuer and Black (2000).

The following describes the methods and what they are based on:

(a) Brothwell (1981)

The Brothwell dental development chart was developed using Native American skeletons and gives an estimation of what the dentition would look like at ages 6 months, 18 months, 3, 4, 6, 8, 10, 12, 15 and 21 years (Brothwell, 1981, p. 64-5). A second chart is also given with ninety-five percentiles for the eruption of permanent teeth, for both girls and boys, in order to give an idea of the variation that can be present within dental eruption ages (Brothwell, 1981, p. 65).

(b) Ubelaker (1989)

The dental development chart presented by Ubelaker is a combination of 16 different studies, using a mixture of Native American Indian children and U.S. white children (Ubelaker, 1989, p. 63-4). Most of the permanent teeth data were from American Indians, while the deciduous teeth data were primarily from American white children. Ubelaker (1989, p. 63) cautions that Native American deciduous teeth may have developed earlier than in ancient populations.

The chart starts with the development of the crowns of the deciduous teeth at 5 months in utero and then at 7 months (Ubelaker, 1989, p. 64). From birth to two years the chart is broken down into between 3 and 6 month stages (*ibid.)*, and from two to 12 years, the chart gives a yearly progression. After twelve there are only three more stages displayed, fifteen, twenty-one and thirty-five years (Ubelaker, 1989, p. 64). At each stage a confidence range is given, ranging from ±2 months to ±3 years at the highest ages (*ibid.)*.

(c) Molleson (1986)

Molleson's (1986) article is a collection of methods she recommends as the most accurate for use in ageing and sexing individuals from an archaeological context. She advocates dental development charts from five different papers and epiphyseal fusion information from six (Molleson, 1986, p. 97). The assumptions upon which these methodologies were based, i.e. that the dentition develops and long bones fuse in a particular, measurable order are still relied on in modern clinical studies (Standring et al.2005, p. 593).

(d) Ferembach et al.(WEA 1980)

The methods written recommended by the Workshop of European anthropologists were developed

by a variety of people, and this paper was intended to be a way of 'unifying methods' used by paleodemographers and to set standard guidelines (WEA, 1980, p. 517). Ubelaker's 1978 dental development chart is recommended for the ageing of juvenile remains as is a diagrammatic guide to epiphyseal fusion made up of findings from five different papers (WEA, 1980, p. 528-31). The article then goes on to recommend methods for ageing and sexing adult remains.

These guidelines sought to recommend the best available methods for generating demographic information from archaeological human remains. The methods advocated were also included in Buikstra and Ubelaker (1994). These two developmental processes in the juvenile skeleton are also used by the medical profession in assessing age and/or normal growth, as discussed below.

(e) Gray's Anatomy (1958, 1980 and 1993)

The ageing information in *Gray's Anatomy* is not a method, but rather a series of guides that are the result of a general consensus by the medical community about when particular bones fuse and teeth develop or erupt. The guides themselves have changed very little over time and, when they have, it is usually only by about a year. For example, one of the fusion estimates of the humerus was given at 11 years old in the 1962 edition and between 9-10 years in the 2010 edition (Standring et al.2005, p. 826; Davies and Davies, 1962, p. 402).

(f) Scheuer and Black (2000)

This book is a compilation of a number of methods and provides data suitable for ageing the juvenile skeleton. It contains methods and advice on the developmental stages of each bone and how accurate these stages are for use in an archaeological setting, and this information is divided up into regions of the body, i.e. head, neck and dentition, the upper limb, the pelvic girdle, etc. Each of these sections considers each of the individual bones in the region, first with a description of the adult bone, then through the development of the bone in the embryonic and foetal development, followed by the ossification stages of the bone from birth to full ossification (Scheuer and Black, 2000, p. 2). The development stages outlined are a collection of hundreds of different methods from a variety of disciplines, including medical, anthropological and archaeological; the bibliography alone is almost 100 pages long (Jantz, 2001, p. 81).

3.3.2 Selection of health indicators

The health indicators chosen for this study are broadly grouped to represent three themes relevant to QoL, "Environment", "Diet" and "Work", shown in Table 3.2 (see Roberts, 2009). Each of these thematic categories contain conditions and diseases that are related to those themes and could have had an impact on the quality of life of any individual who suffered from them; additionally they could also have been the result of the living conditions and lifestyle of individuals who lived at monastic institutions. Several conditions chosen also have a genetic component to their

aetiology, but the environment in which the individual lived, their diet and their level of activity as an adult also has a strong bearing on how or if these conditions developed. While many conditions affecting children leave residual evidence on their bones and teeth, as they cannot be used in this study because there would be no way of establishing whether the individuals analysed grew up at the religious institutions at which they were buried. That being said, poor quality of life as a child can predispose people to developing particular health problems as they age, including coronary heart disease and stroke (James et al.1997, p. 1548).

The juvenile individuals within the cemetery populations of the institutions selected for this research were included in the study as they were associated with the house during their lives, although in what form is unknown. Their quality of life may have been affected by the conditions at the house, as younger children they may have parents who worked at the house and were therefore fed and sheltered by the monastery or nunnery or could have been a student at the house and therefore their health could have been affected by living there (Power, 1926, p. 260-70). Additionally, while it was not unknown for individuals as young as six to enter a monastery or nunnery, it was more often in their mid- to late-teens, and begin their lives as a trainee or novice monk or nun at that age (Harvey, 1995, p. 118-22; Knowles, 1948, p. 418-22).

Other individuals joined monastic institutions much later in life, in fact some members of the aristocracy and gentry used monasteries and nunneries as a type of retirement plan, as was mentioned in section 2.2.2 (McNamara, 1996, p. 262-3; Hager, 1992, p. 393; Knowles, 1955, p. 229-30; Power, 1926, p. 25-6). Their presence in the cemetery population could also skew the results through their having lived a relatively comfortable life and potentially masking health indicators that could suggest poor quality of life or adding a higher proportion of health indicators that would suggest a higher quality of life, including a rich, meat-heavy diet.

Without knowing where the adults grew up, using health indicators that were formed in childhood might not accurately reflect the living conditions at the different houses. For example, enamel hypoplasia is formed when an individual is nutritionally deficient as their teeth are forming; as such it suggests poor diet in childhood (Roberts and Manchester, 2005, p. 75-7; James et al.1997, p. 1548). This health indicator was not chosen for this research, although it remains visible in adult teeth, precisely for that reason, it speaks to quality of life during an individual's childhood, which for the purposes of this research may or may not have been in the religious institution they were associated with later in life.

It must also be remembered that very few conditions that would affect an individual's quality of life will be visible on the skeleton (Wood et al.1992), many of these conditions will only be visible if the condition was chronic, meaning that the individual lived with it for a number of years

(Roberts and Manchester, 2005, p. 7). The majority of illnesses affect only the soft tissues, making them invisible to bioarchaeologists.

The health indicators selected for this research are a mixture of those commonly found and reported on in skeletal populations, dental disease, degenerative joint disease, and traumatic lesions, and others are more rare, DISH, rib lesions, and sinusitis. As such, the researchers may not have been looking as closely for the more rare conditions, especially rib lesions and sinusitis, which were not commonly assessed prior to 1995 (following Lewis et al.1995 and Roberts et al.1994). In addition to this, sinusitis can only be seen when the maxillary sinus is either broken or investigated using an endoscope (Lewis et al.1995, p. 501). This could account for the relative low frequency rates reported in the following chapter.

It is worth explaining at this point how these indicators will be reported. Each is presented as two prevalence rates, a corrected prevalence rate and an element-wise prevalence rate. Corrected prevalence rates are the number of individuals affected by a particular condition out of the total number of individuals in that population regardless of preservation of the part for observation (e.g. spines present to observe spinal tuberculosis). Element-wise prevalence rates are the number of elements (i.e. teeth or femurs) affected out of the total number of bone (or dental) elements observed in the same population. The benefit of reporting element-wise prevalence rates is that it gives a clearer picture of what the actual prevalence rate of a particular condition is within a population (Roberts and Cox, 2003, p. 29). For example, if it is argued that 30% of all individuals in a population are affected by caries that would suggest that three out of 10 individuals had caries. However, if only seven of those individuals had surviving teeth to examine, then 30% is not necessarily the element-wise % prevalence. If those seven individuals had a total of 100 teeth preserved between them and ten of these teeth have carious lesions, than a more accurate rate of 10% of teeth affected should be given.

Table 3.2: Health Indicators explored

	Health Indicators	*Possible Signification*
Environment	Maxillary Sinusitis	Poor air quality Population density Chronic sinus infections
	Rib Periostitis	Poor air quality Population density Chronic chest infections
	Non-Specific Infection	Poor living conditions Poor hygiene Population density Chronic widespread infections
Diet	Calculus	Excess protein (high status diet?)
	Caries	Excess carbohydrates (high status diet?)
	DISH	Excess rich foods (i.e. cream, butter, etc.)
Work	Osteoarthritis	Normal ageing Result of injury Hard labour Obesity
	Trauma	Hard labour Normal injury

The ways in which these health indicators were originally recorded can vary, as some researchers chose to score particular indicators by severity and others chose to record simple presence and absence. For the purposes of this research, a health indicator was recorded as present if it was noted as such by the original researcher. If they recorded it as a scored value of severity, the higher values were automatically listed as present and the lower values were checked against diagnostic criteria if there was any laid out. For example, the diagnostic criteria set out by Rogers and Waldron (2001) for the recording of DISH suggests a minimum of three vertebrae involved. As such, if a research noted that two vertebrae showed indications of bone growth consistent with DISH, this was noted as absent.

Individuals were included in the statistical tests for each health indicator based on their preservation of the elements in question. For example, an individual was included in the maxillary sinusitis statistical tests if they had at least one maxillary sinus preserved. The same is true for rib periostitis (at least one rib), dental disease, (at least one tooth), DISH (at least four vertebrae), trauma (at least one long bone, either upper or lower), NSI (at least one of the lower long bones). As osteoarthritis was scored first on overall criteria and then on a joint-by-joint basis, the criteria were slightly more complicated. To be included in the specific joint surface test, the individual had to have the joint in question preserved. For the overall test, the individual had to have at least one of the joint surfaces present that would be scored in the more specific joint-by-joint tests.

(i) Environment

The environment in which a person lives clearly has a great influence on their quality of life, whether it is the physical (climate, region, etc.), biological (local plant and animal life) or human (culture, living strategy, etc.) environment (Howe, 1997). For example, poor hygiene and air quality can contribute to individuals becoming or staying ill, as can the overall regional climate (*ibid.)*. The three health indicators included in the Environment category are maxillary sinusitis, rib periostitis and non-specific infections. Each of these three conditions could be caused or exacerbated by a poor living environment, and high population density, either through high levels or particulates or bacteria. Higher frequencies in any of the communities included in this study could be indicative of a lower quality of life.

(a) Maxillary Sinusitis

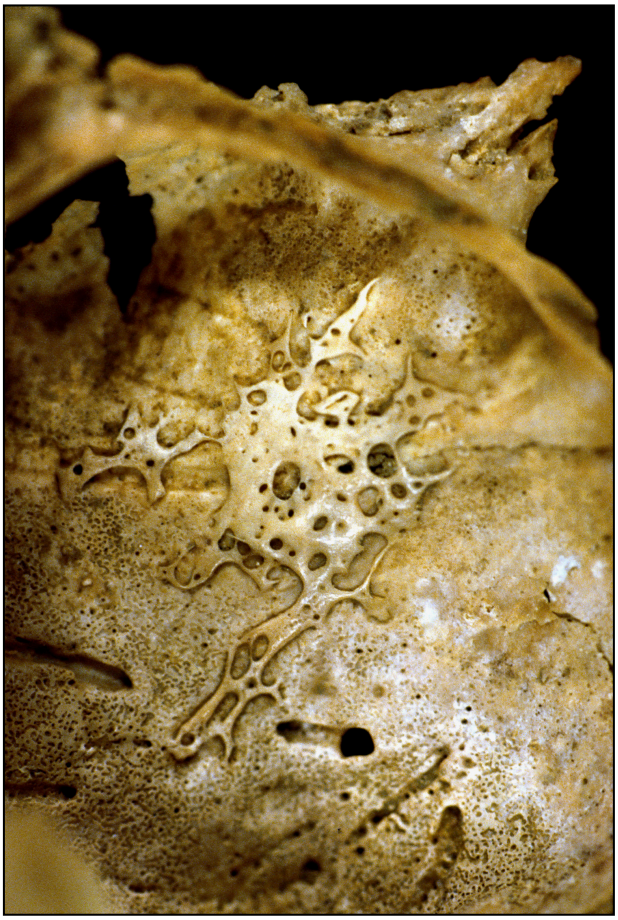


Figure 3.2: New bone formation and pitting associated with maxillary sinusitis (image courtesy of C.A. Roberts)

Maxillary sinusitis can be caused by poor air quality, when the levels of particulates in the air being breathed are too high to be sufficiently filtered out. As air is breathed in through the nose, the hairs or cilia filter out particulates. Sinusitis is a condition that develops when the mucosa's cilia die as the result of the build up and lack of drainage of fluid. This build up is usually the result of a blockage, which may be due to trauma, bacterial infection, temperature change or an excess of

particulates (Slavin et al.2005, S19; Evans, 1994). It can also be caused by dental disease such as caries and abscesses, and there is some evidence to support the idea that viral infections, such as the average cold, could also be a contributing factor (Slavin et al.2005, S26-29). In a living individual, the build up of fluid will result in facial pain and headaches, and this fluid is the perfect breeding ground for microbes, which can cause an infection. If left untreated, it can become a chronic infection (Waugh and Grant, 2006).

Only a chronic infection in the maxillary sinus is detectable archaeologically, seen as pitting and/or new bone formation (Figure 3.2). As the bone is laid down and remodelled, it presents a characteristic 'web-like' pattern (Roberts, 2007; Merrett and Pfeiffer, 2000; Lewis et al.1995). This new bone is only visible if the skull is in some way fragmentary, either through the non-fusion of sutures or post-mortem damage, or if the bioarchaeologist uses an endoscope to examine the maxillary sinuses. Individuals were included in the statistical tests for maxillary sinusitis provided they had at least one maxillary sinus preserved.

(b) Rib Periostitis

Figure 3.3: Lesions on ribs
(image courtesy of C.A. Roberts)

Pulmonary infections are commonly caused by bacteria or viruses entering the respiratory tract, although particulate pollution in the air can also cause inflammation in the lungs (Waugh and Grant, 2006). If the function of cilia in the nasal passageways is reduced, more particulates, toxins and bacteria are allowed to enter the respiratory system, causing irritation and infection (Capasso, 2000; Waugh and Grant, 2006). Respiratory infection primarily involves soft tissue, making it difficult to assess archaeologically. Lower tract respiratory infections are therefore diagnosed archaeologically by the appearance of pitting and/ or new bone formation on the visceral surface of the ribs (Figure 3.3). This has been hypothesised to develop when an individual suffers from an

inflammation of the pleura, or the membrane/lining surrounding the lungs (Capasso, 2000). In a modern context, higher quantities of airborne particulates ultimately lead to higher levels of pulmonary inflammation and infection and can exacerbate existing respiratory conditions (Gilmour et al.2001). As the changes being recorded archaeologically are not reported in a living individual, clinical studies have not described this particular feature of chronic respiratory conditions.

This is not to say that periosteal reaction is completely ignored. In a guide to distinguishing pathological and non-pathological characteristics of ribs, periosteal reactions are discussed as being indicative of tuberculosis or other bacterial infections of the pleura (Guttentag and Salwen, 1999, p. 1138). They also note that ribs may be enlarged on the side most affected, extending a 1996 publication by Eyler et al.(Guttentag and Salwen, 1999, p. 1138). This paper took bilateral rib measurements from the radiographs of individuals affected by tuberculosis and other chronic pulmonary conditions (Eyler et al.1996, p. 922). They found that there was a significant difference in thickness between the affected and unaffected sides of individuals with chronic pleural disease or a clinical diagnosis of tuberculosis, but not those of the control group or patients suffering from empyema (Eyler et al.1996, p. 923).

(c) Non-Specific Infections

Figure 3.4: New bone formation on tibia
(image courtesy of C.A. Roberts)

Infection is the result of pathogens entering the body and destroying cells or releasing toxins. Pathogens can enter the body through open wounds or mucus membranes, such as via the nose or mouth. The success of the pathogen depends on a great many factors, including susceptibility of the host as well as the strength of the pathogen itself (Waugh and Grant, 2006; Playfair and Bancroft, 2004). If a pathogen is able to enter the body and go unrecognised by the body's defences, it will multiply and spread, causing interruption to normal cellular function. The body will attempt to fight the foreign pathogen, provided the individual is not immuno-suppressed, through inflammation, fever and various antibodies (Waugh and Grant, 2006; Playfair and Bancroft, 2004).

This bodily response can leave evidence on the skeleton if the infection reaches the bone tissue (usually haematogenously/lymphatically). If the bone becomes inflamed, the resulting increased blood flow and pus that develops will force the upper layer of the bone up and away from the main body of the bone, and this will result in the death of those fragments. The body will then attempt to form new bone, replacing the dead bone, leaving a layer of new, irregular bone on the surface, visible to a bioarchaeologist (Figure 3.4)(Apley and Solomon, 2000). It is important to note that periostitis is more of a symptom than a diagnosis. It can be the result of a variety of diseases, including infections, scurvy, rickets, benign or malignant tumours, venous insufficiency (circulatory disease), or even a trauma (Resnick and Niwayama, 1988, p. 4113-4).

Non-specific infections are characterised by the presence of new bone formation and/or pitting on the surface of the bones, a reaction known as periostitis (Waldron, 2009; Roberts and Manchester, 2005). Other types of infection that affect the bone are known as osteitis and osteomyelitis. No individuals included in this research were recorded as having either of these lesions. In this research, non-specific infections were noted from the skeletal recording forms to assess prevalence rates within the two populations. If one population was found to have a significantly higher prevalence rate, it is possible that this was due to differences in diet, hygiene, living conditions and access to medical treatment.

(ii) Diet

Modern clinical studies have shown a strong relationship between social status and the rates of caries in school children. 'Dental decay [i.e. caries] is presently very strong related to social class and the increasing disparity in oral health between the 'haves' and the 'have-nots' in our society is of considerable concern' (Rugg-Gunn, 2001, p. 479). It has also been noticed that this has not always been the case and that a survey in the early 1900s found the opposite, that children from wealthier backgrounds were found to have higher rates of caries than those from poorer backgrounds (*ibid.)*. This was the result of the consumption of sugars not found in milk, carbohydrates, fruit and vegetables, but rather the refined sugars available in the modern period.

Many modern campaigns have striven to reduce the consumption of confectionary and 'table sugar,' while increasing the consumption of fruits, vegetables (Rugg-Gunn, 2001, p. 485). These refined sugars were not available to medieval people, although this is not to say that their diet was entirely without sugar. A diet rich in carbohydrates, especially white breads, would be increased an individual's risk to developing caries over one who subsisted primarily on vegetables and brown breads (Roberts and Manchester, 2005, p. 63-9; Sreebny, 1983).

Diet is considered by many archaeologists and bioarchaeologists to be among the strongest correlates of social status, which in turn could have had an impact on an individual or community's quality of life (Curet and Pestle, 2010, p. 414; Larsen, 1997). This was especially true for medieval England where strict sumptuary laws attempted to codify the different foods considered appropriate for different levels of society (Hammond, 1995). Although the fact that these laws are often found repeated in the legislation suggests that they were less effective than originally hoped. Monastic rules also stated what could and could not be eaten and on what days (Harvey, 2002, Bond, 2001). It is well understood that certain foods have positive and negative effects on an individual's health as they can either strengthen or weaken one's immune system. The health indicators in this theme have been included because of the impact that diet has on their occurrence. Communities with high frequencies of any of these indicators may have had high levels of particular foods in their diets, foods that could give an indication of social status.

The diet of medieval people, as discussed in the previous chapter (Section 2.3.1), varied considerably by region, level of urbanism, and wealth. Differences in diet could have led to a variety of differing health risks. A rich diet with high levels of protein and sugars and low levels of fruit, vegetables and coarse grains, as has often been typified as comprising a high status diet in medieval Europe could result in high prevalence of dental caries, calculus and periodontal disease, diseases related to obesity, as well as those associated with certain vitamin deficiencies (DeWitte and Bekvalac, 2010, p. 8; Dyer, 2009; Haffajee et al.2009, p. 511; Hammond, 1995; Kinane, 2001, p. 11; Woolgar, 2001; Dyer, 1998; Harvey, 1993; Dyer, 1989; Resnick and Niwayama, 1988, p. 4113-4). However, this diet is also suggested to have included high levels of fish and other sea food which could have prevented some of the dental problems by increasing the level of fluoride in the body, a mineral that has been shown to reduce the rate of dental caries, when added to toothpaste, mouthwash and the water supply, by as much as 30-40% in modern populations (Rugg-Gunn, 2001, p. 480). The monastic diet, as recommended by the Benedictine Rule, should have relied heavily on fish (Bond, 2002, p. 183; Harvey, 1993 46-51; Benedict et al.1990, p. 62).

The implication that the high status diet was not particularly healthy, however, does not automatically make the lower status diet healthy. The heavy reliance on fruit, vegetables and course grains, with little protein would, at first, suggest a relatively healthy diet (Dyer, 2006, p. 35-6).

However, the high carbohydrate, and therefore sugar, intake in the diet, provided by a reliance on cereal crops and root vegetables, would have also had a detrimental impact on the dental health of these individuals (DeWitte and Bekvalac, 2010, p. 8; Davies, 2004; Dyer, 1998, p. 154-60). In addition to this, their access to fluoride via seafood would have been limited by their purchasing power (Dyer, 1998; Hammond, 1995; Dyer, 1989). The most regularly consumed fish during Lent, according to written accounts, was herring as it was easily preserved (Hammond, 1995, p. 19; Dyer, 1989, p. 157). Fruit and vegetables would have been a mix of dried and fresh, with a reliance on dried and preserved food during the late autumn, early spring and throughout the winter months (Dyer, 1998, p. 60; Dyer, 1989, p. 160). In addition to this, the fruits and vegetables were not necessarily varied and would have consisted primarily of those readily harvested in winter, and those that had been preserved during the previous season (Dyer, 2006, p. 212).

The two diets discussed here represent the extremes of wealth and poverty. There would have, of course, been a spectrum of diets. The religious houses of the medieval world are largely represented as following the more aristocratic or gentry lifestyle (Dyer, 2006, p. 28; Vickers, 1995, p. 127; Harvey, 1993, p. 34; Knowles, 1955, p. 229-30; Power, 1922, p. 74). However, with the wide spectrum of incomes and resources found at religious houses, it is more likely that some houses lived like the aristocracy, while others lived a more modest life (Bell, 2007, p. 124; Bond, 2003, p. 75; Snape, 1926, p. 119). This study, therefore, is seeking to assess what impact specific factors had on these differences.

(a) Carious lesions

Figure 3.5: Two teeth with carious lesions
(image courtesy of C.A. Roberts)

Carious lesions (colloquially known as cavities) are the result of a demineralisation of the enamel, dentine and cement of a tooth. This demineralisation is the result of the fermentation by bacteria in

dental plaque of carbohydrates and sugars in an individual's diet (Masalin and Murtomaa, 1992). These can be seen archaeologically as dark spots and holes in the surface of the tooth (Figure 3.5) (Hillson, 2005). Although there is a wide range of severity scoring systems for carious lesions used by bioarchaeologists, this study only records lesions as present or absent.

Dental caries have been included as a health indicator in this study because they are considered to be suggestive of a high status diet, specifically the high carbohydrate levels through the consumption of 'white' bread, as well as the sugary desserts popular among the aristocracy (DeWitte and Bekvalac, 2010, p. 8; Dyer, 2009; Hammond, 1995; Davis, 2004; Wilson, 2002; Woolgar, 2001; Harvey, 1993). However, the "peasant" diet would have been high in those carbohydrates found in vegetables (DeWitte and Bekualac, 2010, p. 8; Davies, 2004; Dyer, 1998, p. 154-6). Both diets should have contained high levels of fluoride, especially within a monastic house, as the consumption of fish was central to both the Benedictine Rule and the Church's Lenten guidelines (Harvey, 1993, p. 46-51). However, the more refined carbohydrates in the white bread would have left those eating a high status diet more open to the development of dental caries (DeWitte and Bekvalac, 2010, p. 8). Therefore, high prevalence rates of dental caries in this research will be tentatively considered as potential indicators of high status, but only when taken in association with other factors.

(b) Dental Calculus

Figure 3.6: Dental calculus and abscess (image courtesy of C.A. Roberts)

Calculus, mineralised plaque, can be seen archaeologically as a lumpy, greyish-brown material on and around the tooth surface (Figure 3.6) (Hillson, 2005). Plaque is formed by the build up of microscopic organisms on the teeth (Kinane, 2001, p. 9). The rate of development of plaque in dependent on the individual's diet, composition and the amount of saliva, presence or absence of

gingival inflammation, composition of the bacterial load and the natural response of the host (Haffajee et al.2009, p. 512; Kinane, 2001, p. 9). The amount and composition of plaque or calculus can influence whether or not a person develops gingivitis or periodontitis, inflammation of the soft tissues in the mouth (Haffajee et al.2009, p. 511; Kinane, 2001, p. 11).

As with carious lesions, calculus has been used as an indicator of high status diet in archaeology, as diets rich in protein can predispose to its development (Lieverse, 1999, p. 219). This assumes that only those of high status or wealth would have access to enough protein to be able to influence the development of calculus. As discussed above, the high status medieval diet could be high in protein and so could have had an impact on the development of dental calculus. However, monastic communities, and any household following strict Lenten guidelines, were supposed to eat fish in place of meat, which could have protected teeth against the build up of dental calculus as the presence of fluoride in a person's diet can reduce their susceptibility to dental problems (Malde et al.2011; Cheng et al.2007; Erdal and Buchanan, 2005; Watts and Addy, 2001; Sibbison, 1990). As such, a diet high in protein would not only indicate potential high status, but also a lack of adherence to the Benedictine Rule and, potentially, the Church's Lenten guidelines (Harvey, 1993, p. 46-51). Therefore, high prevalence rates of dental calculus in this study could be indicative of a good physical quality of life, i.e. access to high status foods and lifestyle, but a poor spiritual quality of life.

(c) Diffuse Idiopathic Skeletal Hyperostosis (DISH)

Figure 3.7: Three vertebrae with new bone growth characteristic of DISH (image courtesy of C.A. Roberts)

Diffuse Idiopathic Skeletal Hyperostosis or DISH is a condition where soft tissues in the skeleton, especially the spine, ossify or turn to bone. This ossification occurs generally along the right side of the spine, usually in the lower thoracic vertebra. It has a characteristic dripping candle-wax appearance (Figure 3.7). In severe cases, this build up can put pressure on the spine, potentially causing paralysis or death (Goto et al.1995; Rogers and Waldron, 2001). It appears more commonly in men, primarily affecting individuals over the age of 50, and today can cause stiffness and restrictive movement in the neck and spine. For the purposes of this research, only individuals who were estimated to have an age above 25 were included in the statistical tests for this health indicator. Both clinically and archaeologically, including this research, it is diagnosed only when at least four adjacent vertebrae have fused (Rogers and Waldron, 1995).

As with the other conditions in the study, is only recorded as present or absent. At this time, DISH is a condition with an unknown aetiology, although likely causes include an overly rich diet, sleep deprivation, insulin or glucose impairment, lack of exercise as well as a possible genetic component (Rogers and Waldron, 2001; Spencer, 2008; Gangwisch et al.2005). A 2002 study found that, when patients with DISH were compared with similarly aged patients with spondylosis, the individuals with DISH were more likely to have been overweight in their, 20s, as well as at the

time of the study (Kiss et al.2002, p. 28). Although the individuals with DISH also had a higher rate of non-insulin dependent diabetes, the exact relationship between the two (DISH and diabetes) was still unclear (Kiss et al.2002, p. 29). They conclude that, although obesity at an early age plays a roll in the development, the precise aetiology of DISH is still unclear (*ibid.)*. Because of the link with obesity and possibly diet, it has been used in the past to infer high status and is often seen in medieval monastery cemetery populations in Europe, so much so that it was thought for a time to be an occupational disease of medieval monks, but it has also been found in many other populations (Spencer, 2008).

(iii) Working

The contribution that physical activity has on the development of trauma and osteoarthritis (Seedhom, 2006; Apley and Solomon, 2000; Cooper et al.1998; Aspelin et al.1992; Resnick and Niwayama, 1988), as well as the impact that both conditions potentially have on mobility (Salter, 1999; Aspelin et al.1992; Sokoloff, 1969), are the two main reasons they have been grouped together under this thematic category. Questions regarding an individual's mobility are often used in modern questionnaires to assess a person's quality of life, with low mobility being considered to have a negative impact on quality of life (Rapley, 2003). However, it must be remembered that levels of pain and the effect of a disease on an individual's mobility are not possible to assess using skeletal remains (Roberts, 2009, p. 155). The frequencies of these conditions here are statistically compared in order to assess if a difference exists, and only after this assessment can conclusions regarding the cause or effect these conditions may have had on these communities be determined. This research is not an attempt to infer specific behaviours from skeletal remains, although both health indicators included in this section have been used in this way (see Jurmain, 1999 for discussion). The following two health indicators will be examined in the context of the wider community or population to which the individuals belonged.

(a) Osteoarthritis

Figure 3.8: Patterns of wear on distal femur characteristic of osteoarthritis (image courtesy of C.A. Roberts)

Osteoarthritis (OA) is a condition whereby the articular cartilage on joints degenerates. This exposes the bone, leading to erosion and remodelling (Salter, 1999; Sokoloff, 1969). It can be attributed to the normal ageing process, trauma, repetitive stress injury, and obesity as well as having a possible genetic component; it is more commonly seen in women (Waugh and Grant, 2006). A study of the risk factors for OA of the hip specifically found that, although there was positive association between hip OA and some sporting activities, obesity and a previous injury were higher risk factors (Cooper et al.1998, p. 519-21). Another study found that for activity related OA, especially of the knee, it wasn't just the simple fact of high impact or other activity that could result in the development of OA later in life (Seedhom, 2006). Through the study of cadaverous cartilage, Seedhom found that, like any other organic material, cartilage needed to be conditioned (or stretched) before heavy use (*ibid.)*. He concluded that a Western lifestyle combining a sedentary life with high impact and heavy activity for short periods of time during the week resulted in overstrain of cartilage, without proper conditioning, leading to it becoming worn out and weak, which led to the development of OA (Seedhom, 2006).

In archaeological populations it is diagnosed first by the presence of eburnation (Rogers and Waldron, 1995), where two bones have come into contact with each other after losing their cartilage and, with continued use of the joint means that they have "rubbed together" forming a dense, shiny surface (Figure 3.8). Archaeologically, porosity, changes in the shape of the joint and the formation of osteophytes, or new bone, on and around the surface of the joint can also be used as diagnostic criteria (Rogers and Waldron, 1995). For this study, OA was recorded if the original researcher recorded it using the criteria of Rogers and Waldron (1995): that the joint must show eburnation or at least two of the following: osteophytes, pitting on the joint surface or alteration of

the joint contour (Rogers and Waldron, 1995). There are several methods for evaluating the severity of osteoarthritis (see Rogers and Waldron, 1991 and Jurmain, 1995), but only presence or absence is be used in this study. Additionally, only individuals aged in the adult age groups (i.e. over 17) were included in the statistical tests for this health indicator. OA was included as a health indicator due to the impact the condition can have on mobility and quality of life as well as being active and diet related in aetiology.

For the purposes of this research, a joint was considered to be present when at least one of the component bones was preserved for observation, i.e. if the left femur was present, then both the left hip and knee were considered to be present. The spine was recorded as a single joint, as several individuals had 'osteoarthritis of the spine' recorded originally with no indication of how many vertebrae were involved. The temporomandibular joints (TMJ) were also considered as a single joint, as were the sacroiliac joints, for similar reasons.

(b) Trauma

Figure 3.9: Misaligned healing of a fracture of the tibia and fibula (image courtesy of C.A. Roberts)

Trauma is used as a heading for both soft tissue injuries that have ossified as well as fractures and other traumatic injuries directly involving the bone. Fractures occur when a bone is placed under more stress than it can withstand. This can occur as the result of a single injury, a gradual

weakening over time due to repetitive activities, or because of a weakening of the bone due to a pathological condition (Apley and Solomon, 2000). It can also occur as a result of interpersonal violence. Soft tissue can also ossify if injured (Aspelin et al.1992, p. 601).

When a bone fractures there is a period of inflammation in which a hematoma (collection of blood) forms; following this, a callus (immature unmineralised bone) forms, which stabilizes the area (Resnick and Niwayama, 1988, p. 2771). This bony callus is irregular and not very stable. Over time, new bone is laid down that is more regular, mature and stronger (*ibid.)*. The bony callus can be detected archaeologically, as can the more regular replacement new bone, although if the two ends of the fracture are united cleanly, a healed fracture may only be detectable with radiographs (Figure 3.9) (Merbs, 1989). However, if a fracture was misaligned or became infected, the new bone will be irregular and misalignment may be visible macroscopically (*ibid.)*.

No radiographs are used in this study due to lack of time and funds, but any available radiographs with the site archives were accessed. A comparison between well-healed fractures and poorly healed fractures is also carried out. This allows discussion on medical intervention and any variability between sites.

3.4 Organising and Assessing Artefact Assemblages

The second dataset in this research is that of artefacts. The artefact classes were formed based first on the understood use of an object and second on the kinds of artefacts expected to be found in the inventories and site reports. These were religious objects, dress accessories and jewellery, evidence of reading and writing, medical equipment, various domestic, agricultural and industrial tools, and animal bones. The identifications were either made in the original site reports, or were amended by the author according to previous knowledge and understanding gained in examining artefacts from religious sites (Tallyn, 2007). Each class relates to a different aspect of the lives of the inhabitants of the religious institutions in this research, from diet to occupation, adornment to hygiene. There may also be artefacts that cross two classes, for example a ring with a religious engraving on it, and these are categorised on a case-by-case basis, based primarily on the description given to the object in the original excavation notes and/or specialist report where available and, secondly, on the experience of the author.

However, it is important to keep in mind that objects found at these religious sites may not have belonged to the monks or nuns who lived there. Monasteries and nunneries were patronised by a wide range of people, including high status visitors and pilgrims (Harvey, 2002). As with the human remains discussed above, however, any link between an object and an archaeological site gives an indication of either the lives of the inhabitants of the site and/or the lives of the people associated with it. Meaning that if a sufficiently high proportion of high status artefacts were found

at a particular house or type of house, it could suggest that either the inhabitants themselves had status and/or wealth or entertained a large number of people who did, reflecting to social standing of the house and its inhabitants.

(i) Religious Objects

It was customary in Medieval Europe for people to go on pilgrimages to holy sites (Swanson, 2007). Over time, these sites began to hand out, or sell, keepsakes as a way for people to prove that they had visited that particular shrine. Along with rosaries and religious jewellery, these items were often seen as talismans that gave protection to the person wearing them, or protection against evil spirits, temptations and illness (Spencer, 1998). Items such as these have been found at medieval sites throughout Europe (Hinton, 2005).

Another popular medieval religious tradition that can leave archaeological evidence is the practice of indulgences. Indulgences were essentially pardons given by the Pope, forgiving an individual of sin so that they might reduce the amount of time spent in Purgatory (Swanson, 2007). These were often given in the forms of an official letter, which was sealed with an official papal seal. Individuals were often buried with the indulgence and its seal; the indulgence decayed, but the seal can survive archaeologically (Gilchrist and Sloane, 2005). This class of religious objects is included in this research because the sites being analysed are religious sites and are from a period in history when Christianity was a powerful cultural and political force throughout most of Europe.

(ii) Dress Accessories/Jewellery

Although contemporary religious tenets dictated that monks and nuns were supposed to dress plainly, without any personal adornment, bishops' visitation records, contemporary literature and objects found at religious sites suggest that this particular rule was not always followed. Objects described in visitations and literature include rings, brooches, necklaces, and silver or gold wimple pins, which correspond with some of the kinds of artefacts found at religious sites (Gilchrist and Sloane, 2005; Hodges, 2005). Many items falling into the Dress Accessories/Jewellery artefact class would have been worn for utilitarian uses, tiring pins for keeping a nun's veil in place, or simple brooches to fasten a cloak. Some of these items, however, when made from precious metals or containing gems, would not have fallen into the 'correct' attire for monks or nuns. Other items that were forbidden by the various monastic rules, such as rings, necklaces or ornaments, could be indicative of personal property or wealth (Hodges, 2005). This category of artefacts is included in this study because of the information regarding personal wealth and adornment of the inhabitants of medieval English monasteries and nunneries.

(iii) Writing/Reading

It was expected of medieval monks that they would spend a good proportion of their day reading,

studying and copying religious texts (Benedict et al.1990). Some authors have suggested that some nuns were also engaged in similar tasks (Bell, 1995). Evidence of reading and writing, including book bindings, styli, and pigment, have been found at a number of monasteries (Gilchrist and Sloane, 2005). This class of artefacts has been included to explore the differences, if any, of reading and writing materials found at monasteries and nunneries and what these differences might suggest about the status of their inhabitants.

(iv) Medical Equipment

As with medicine today, medieval medicine was primarily aimed at prevention, and people only intervened when the situation became more than the body could handle on its own (Rawcliffe, 1997). Medieval medicine used herbs, gems, and prayers to both prevent and treat illness, but evidence of this does not usually survive archaeologically. Other tools used include knives used in medicinal bleeding, and jars or flasks used for examining urine and other excreta; these can survive archaeologically and have been found at monastic sites (Gilchrist and Sloane, 2005).

(v) Domestic/Agricultural/Industrial Tools

As with any large household of the time, monasteries and nunneries would have had large numbers of people working in a variety of industries to keep the organisation going. This means that monks, nuns and people under their employ would have needed tools and equipment for a wide range of occupations, including farming/gardening equipment, cooking utensils, tools for grinding flour, making crockery, and other specialist equipment. Several of these jobs, however, may have been carried out on other sites or the monastery or nunnery may have bought the products from an external source with revenues from other activities (Bond, 2004, p. 2003).

Items relating to cooking, farming, woodworking and animal husbandry have been found at monastic sites around England (Bond, 2004). Tools relating to metallurgy and other more specialist occupations have also been found (Bond, 2004, p. 329-353). It has also further been noted that the material some tools are made of can be indicative of differences in status. For example, a goldsmith in Carlisle left all of his tools and equipment to his son in 1379. One of these tools was a baslard made of silver, and this type of knife was, as the material suggests, more of a status item than a particularly useful tool (Hinton, 2005, p. 228). This class of artefacts has been included in this research in order to assess not only production by the inhabitants of the sites being studied, but also their perceived social status and spending power.

(vi) Animal Bones

It is widely accepted that people of different social statuses and/or spending power eat different kinds of food. In medieval England, this was true for the different kinds of flour/bread people ate, and the kinds of fruit, vegetables and cuts of meat eaten (Thomas, 2006; Maltby, 2006), as

discussed above. Medieval monastic rules had strict dietary restrictions, including a ban on consuming the meat of four legged animals (Benedict et al.1990). However, over time, observation of these rules lessened and it was often recorded in visitation records and contemporary literature that monks ate red meat regularly (Harvey, 2002; Bond, 2001). Unfortunately, due to differences in recording techniques and missing records for some of the sites, animal remains could not be included in this research.

3.5 Documentary Sources

The third type of evidence used in this research was documentary sources. Two contemporary documents were used to identify information about the specific monastic houses included in this research. One of these was also used to gather information about a large number of monastic houses in England. The two documents are the *Monasticon Anglicanum* and the *Valor Ecclesiasticus.* In the following two sections, each will be described and a brief overview of the history of the document and the limitations of that specific document will be discussed. This will be followed by an outline of how each document was used in this research.

(i) Monasticon Anglicanum

The *Monasticon Anglicanum* is a collection of charters and other papers relating to monastic houses in the UK. William Dugdale, using his own research and that of Roger Dodsworth, assembled it in the late 17th century. The information in it primarily relates to the financial standing of the various monastic houses and is largely comprised of information found in charters and other legal documents (Dugdale, 1970). It also contains information relating to the founding of many houses, as well as limited documentation relating to subsequent land holdings of the various institutions (Dugdale, 1970).

The primary limitations of this document are mostly due to the fact that it was collated over a hundred years after the Dissolution. This later collection means that a lot of documents have been destroyed or simply decayed (Dugdale, 1970). Some of the documents have conflicting information both with documents held within the *Monasticon* itself, as well as the information held in *Valor*. The other limitation to this document is that far more information was preserved from the larger institutions and less on smaller. That could be the result of these larger institutions simply generating more records or that people weren't as interested in the records of the smaller houses at the time of the Dissolution. Sadly, the true reason for this is unknown.

For example, in this research, the *Monasticon Anglicanum* was used as a source for information relating to the assessed value of all of the monastic houses in England at the Dissolution. There were a number of houses for which there was no recorded value, because no charters survived from these institutions and so their income information is lost. That being said, the number of houses

with their incomes recorded forms a substantial percentage of the total number of houses in the *Monasticon* and it was felt that there were more than enough to use as a representation of the whole.

The income value for each house was recorded in a Microsoft Excel (2011 for Mac) and then transferred to PASW 17.0 for analysis. The details of the tests used are below. The results of the statistical tests on this data are used as a way of assessing how closely the sample houses selected for this research compare to the averages nationwide.

(ii) Valor Ecclesiasticus

The *Valor Ecclesiasticus* is similar to the *Monasticon Anglicanum*, in that it is a collection of information relating to monastic institutions. Unlike the *Monasticon,* however, it is the actual valuation survey that was carried out at the behest of Henry VIII, rather than a collection of information from a number of different sources. It also includes information about the pensions granted to monks, nuns, and friars at Dissolution.

The primary limitations of this collected work is that the individuals who carried out the survey were not specifically trained in any financial field or census work. They were individuals located within a reasonable distance to the various institutions, and who were willing to do the work and had enough education to carry it out (Knowles, 1976, p. 159-60). There are a few instances where the people who were carrying out the survey on a particular house purposefully misrepresented the value of that house for their own benefit (Knowles, 1976, p. 171-4).

The *Valor Ecclesiasticus* was primarily used in this research for the pension information relating to the specific eight houses included in this research. Because of its length and size, the income information for all the monastic houses recorded in it was not as easily accessible as the *Monasticon*. However, the pensions granted to the individuals still living in the eight houses included in this research were recorded and could therefore be used to compare both the financial standing of the houses and gain some insight into the social value placed on monks and nuns at the time of the Dissolution.

This data was not compared statistically.

3.6 Database

As the combined artefact assemblages and skeletal collections for all eight sites would result in a very large spreadsheet or database, alternative technology was explored. Through a personal connection with a web developer at Hornet Web Solutions, an online, bespoke database was built using a MySQL backend and a PHP and HTML frontend. The benefits of this online database were

that it was easily accessible, interrogated, and could handle large amounts of data. The search facilities allowed for both counts to be generated of particular 'items' (e.g. how many males at St James Priory) as well as whole sections of the database to be exported into a Microsoft Excel spreadsheet when more direct access to the data was required. The one disadvantage to the database was that it was not possible to access when there was no Internet connection. However, with some manipulation, it was possible to import some data from Excel spreadsheets directly into the database, thus solving the problem.

3.7 Statistical Methods

In order to properly analyse and compare the artefacts and the skeletal material for the eight sites, the chi-squared test is used to establish if any differences in frequency of different artefact classes and health indicators between the groups of people (north/south/nuns/monks/urban/rural) was statistically significant. As with the demographic information, each of these variables are tested four times, comparing the sites' urban or rural location, north or south location, older or reformed order, and whether it was a male or female house. By testing each variable separately, it was be possible to examine whether there was more difference in the quality of life as reflected in a variety of evidence between monasteries and nunneries, or if the difference lay more in location, geography or order.

The chi-squared test can be used to assess the relationship between two categorical variables (Field, 2009, p. 688). The data included in this research matches this criteria. A 95% confidence interval was used which means, to put it simply, if a statistically significant difference is found, that difference is going to be the result of a real difference 95% of the time (Field, 2009, p. 45). This means, however, that 5% of the time or in 5% of cases that difference is purely the result of bias and does not indicate real different. This is worth bearing in mind when drawing conclusions using this test.

The valuation information, as recorded in the *Monasticon Anglicanum*, was compared using an ANOVA test and was further analysed using the Tukey Post-Hoc test. As with the artefacts and skeletal information, the valuation information was tested for significant differences between the various groups that have been the focus of this research (north/south/nuns/monks/urban/rural), although this was done using the ANOVA test rather than the chi-squared test. The Tukey Post-Hoc test was used in order to identify where exactly the differences between these groups was.

ANOVA can be used to assess the differences between the means of several different groups (Field, 2009, p. 349). It is used to assess whether the groups are different enough from one another to constitute them being separate (*ibid.)*. The Tukey Post-Hoc test goes one step further to investigate the specific relationships that have caused the difference to be significant (Field, 2009,

p. 385-6).

In terms of reading the results, the "p" value given, for both the chi-squared and the ANOVA tests, represents the confidence interval, although instead of being given as a percentage it is reported as a decimal. As an example, any p value less than 0.05 (i.e. 5%) is interpreted as statistically significant.

These tests were run using PASW Statistics 17.0 (formerly called SPSS) for Mac.

3.8 Conclusion

The preceding chapters outlined the extant published literature relating to the subject matter of this research to place this study into the wider academic context. In addition, the materials assessed and the methods used have been reviewed. The next chapter describes the results of the data analysis.

Chapter 4: Results

This chapter presents an overview of the analysis of all the data collected, termed 'combined sites.' The breakdown of results for each site individually can be found in Appendix C. Following the overview of the combined sites, comparisons between the groups, (i.e. male/female, north/south, urban/rural, and older/reform) are outlined, along with the results of the chi-squared tests.

4.1 Combined Sites

The eight sites used in this research are listed below with the relation each has to groups being compared as well as an outline of the areas excavated at each. The results of each site are listed in Appendix C.

- Priory of St Andrew Fishergate, York, North Yorkshire
    - Male; North; Urban; Reform Order
    - Church and most of the claustral buildings
- St Clement's Priory (Clementhorpe), York, North Yorkshire
    - Female; North; Urban; Older Order
    - Unknown
- Elstow Abbey, Elstow, Bedfordshire
    - Female; South; Rural; Older Order
    - Eastern arm of the abbey church, the eastern claustral ranges, and the outbuildings south of the main nunnery complex
- Hull Austin Friary, Kingston-upon-Hull, Yorkshire
    - Male; North; Urban; Reform Order
    - Aspects of the friary church (chapel, nave, choir), the eastern and western range, as well as the cloister
- The Priory of St James, Bristol, Gloucestershire
    - Male; South; Urban; Older Order
    - Eastern end of the priory church and associated burial ground, the lay burial ground, and the boundary wall to the west
- St Mary's Abbey (Nunnaminster), Winchester, Hampshire
    - Female; South; Urban; Older Order
    - Southwestern corner of the cloister and the southern side of the nave
- Sinningthwaite Priory, Bilton in Ainsty, North Yorkshire
    - Female; North; Rural; Reform Order
    - Eastern range and part of the church
- Hulton Abbey, Stoke-on-Trent, Staffordshire
    - Male; South; Rural; Reform Order
    - Chapter house, nave and other aspects of the church

This section describes the demographic profile of the burials studied and an outline of prevalence rates for the various health indicators, followed by an overview of the total artefact assemblage identified. The final section is a brief overview of the financial data for the sites included in this research. This is all followed by a description of the data from each individual site.

4.1.1 Burials

(i) Demography

There were 1336 individuals in total included in this study; 524 (39.2%) were identified as male,

96 (7.2%) as possible male, 67 (5.0%) as possible females, 311 (23.3%) females, 133 (10.0%) adults whose sex could not be determined, and 205 (15.3%) juveniles (Figure 4.1).1 This gives an overall sex ratio of 1.64:1 in favour of males.

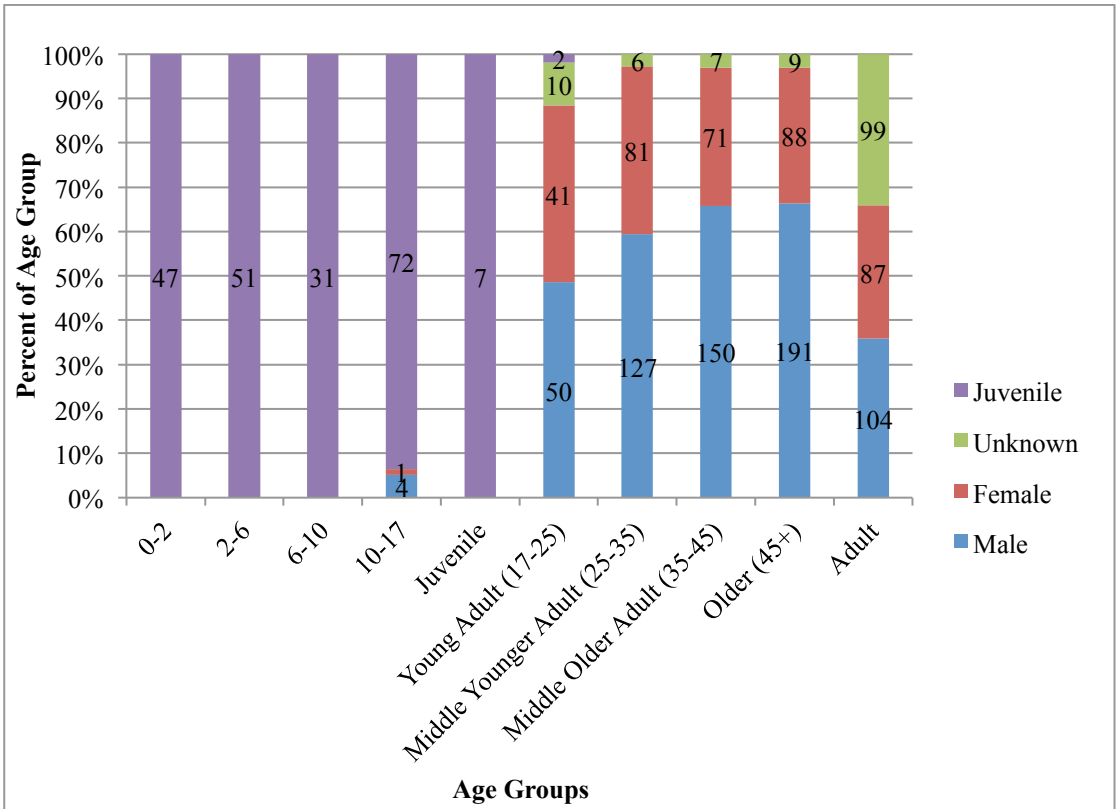


Figure 4.1 Demography of all Sites

The largest age category for the adults (288 individuals; 25.6% of adults) was the 45+ year age group when the 'adult' age group (290 individuals; 25.8% of adults) is ignored (Figure 4.1). The 35-45 age group is the next largest (228 individuals; 20.3% of adults), followed closely by the 25-35 group (214 individuals; 19.1% of adults). The smallest adult age group is the 17-25 category (103 individuals; 9.2% of adults).

The largest juvenile age group is the 10-17 category (77 individuals; 36.2% of sub-adults), followed by the 2-6 (51 individuals; 23.9% of sub-adults), 0-2 (47 individuals; 22.1% of sub-adults) and 6-10 (31 individuals; 14.6% of sub-adults) year age groups. There were only seven individuals identified as 'Juvenile' only with no age group identified (3.3% of sub-adults).

Overall, the males outnumber the females in every age category (Figure 4.1).2 The adults of

1 M and F are male and female respectively, while ?M and ?F are individuals who are assessed as probable males and females. U are individuals whose sex was not possible to determine and J are juvenile individuals.

2 This style of table will be used throughout this chapter. The numbers written within the column are the number of individuals identified within that age and sex group. Each column as a whole

undetermined sex also outnumber the females in the Adult age group. As there were more individuals from the monasteries compared to the nunneries, this inequality is not unexpected (See section 4.10).

(ii) Health Indicators

The health indicator that was found to affect the most individuals was dental calculus, followed closely by dental caries (Table 4.1.4). Non-specific infection was recorded in 27.2% of individuals (300) and osteoarthritis in 19.1% (214). Maxillary sinusitis (43) and trauma (63) were both recorded in just over 5% of the population, while DISH was recorded in just under. The least common health indicator was rib periostitis.

The terms corrected and element-wise prevalence rates are used throughout this chapter. As discussed in the previous chapter, corrected prevalence rates refer to the number of individuals with the health indicator recorded as present out of the total individuals that could have been affected, i.e. in the case of dental calculus the total number of individuals who had at least one tooth preserved. Elements-wise prevalence rates refer to the number of elements (e.g. teeth, long bones, etc.) affected out of the total number of elements observed for the population. For both dental caries and calculus, this refers to the total number of teeth present in the population. DISH was recorded according to the total number of vertebrae present for observation, maxillary sinusitis according to the total number of sinuses present for observation (either one or two), rib periostitis according to the number of ribs present for observation, and trauma according to the total number of long bones present. Non-specific infection was calculated only out of the total number of femora, tibiae and fibulae present, while osteoarthritis was assessed according the total number of synovial joints present for observation.

Table 4.1 Corrected Prevalence Rates for all Sites (Individuals affected)

Health Indicator	Absent	Present	Percent Affected
Calculus	414	241	36.8%
Caries	458	199	30.3%
DISH	668	31	4.4%
Maxillary Sinusitis	774	43	5.3%
Non-specific Infection	804	300	27.2%
Osteoarthritis	907	214	19.1%
Rib Periostitis	834	13	1.5%
Trauma	1148	63	5.2%

Dental calculus was also the most prominent health indicator when the element-wise prevalence rate is examined, and recorded on 32.8% (3857) of surviving teeth. Non-specific infection was the

represents 100% of that age group and the different sexes are represented as proportions within those age groups.

second most documented health indicator, recorded on 13.8% (744) of all combined femora, tibiae and fibulae. Both osteoarthritis (519) and dental caries (476) were recorded on approximately 4% of bone elements and 4% of teeth, while DISH was only identified on 1.5% of all vertebrae (177). Trauma was found to have affected less than 1% of all long bones (82).

Table 4.2 Elements-wise Prevalence Rates for all Sites (Elements affected)

Health Indicator	Absent	Present	Percent Affected
Calculus	7897	3857	32.8%
Caries	11278	476	4.0%
DISH	11898	177	1.5%
Non-specific Infection	4633	744	13.8%
Osteoarthritis	12000	519	4.2%
Trauma	10570	82	0.8%

As stated above, the most common health indicator was dental calculus, which was identified in 36% of the total population and 32% of the total present teeth (Tables 4.1 and 4.2). A higher percentage of females were affected by dental calculus with 29.4% of all individuals with teeth having some calculus present (1810 individuals). Only 16.8% of males (1753 individuals), 9.8% of adults of undetermined sex (175 individuals) and 6.3% of juveniles (119 individuals) had any dental calculus present (Table 4.3).

Table 4.3 Age and Sex Distribution for Dental Calculus: Corrected and Elements-wise Prevalence.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.2% (1)	--	--	--	1	0.03% (4)	--	--	--	4
2-6	0.5% (3)	--	--	--	3	0.05% (6)	--	--	--	6
6-10	0.3% (2)	--	--	--	2	0.05% (6)	--	--	--	6
10-17	1.1% (7)	0.0% (0)	0.2% (1)	--	8	0.8% (103)	0.5% (57)	0.06% (8)	--	168
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	1.5% (10)	3.4% (22)	0.5% (3)	35	--	1.5% (176)	4.2% (493)	0.3% (34)	703
25-35	--	3.1% (20)	3.7% (24)	0.2% (1)	45	--	2.5% (291)	3.8% (443)	2.3% (27)	761
35-45	--	4.1% (27)	3.1% (20)	0.3% (2)	49	--	4.7% (550)	3.3% (389)	2.9% (34)	973
45+	--	6.1% (40)	5.2% (34)	0.5% (3)	77	--	5.1% (605)	3.0% (358)	2.3% (27)	990
Adult	--	1.1% (7)	1.5% (10)	0.6% (4)	21	--	0.6% (74)	1.0% (119)	0.5% (53)	246
Total	13	104	111	13	241	119	1753	1810	175	3857

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The second most common health indicator was dental caries, which was similarly found at a higher frequency in females, with 19.3% of individuals (202 individuals) having at least one lesion recorded (Table 4.4). Males were closer in frequency rate to females, however, with 15% being affected (197 individuals), followed by 11.3% of adults of undetermined sex (36 individuals) and 8.8% of juveniles (41 individuals).

Table 4.4 Age and Sex Distribution for Dental Caries: Corrected and Elements-wise Prevalence

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.5% (3)	--	--	--	3	0.03% (4)	--	--	--	4
2-6	0.6% (4)	--	--	--	4	0.2% (19)	--	--	--	19
6-10	0.6% (4)	--	--	--	4	0.07% (9)	--	--	--	9
10-17	1.1% (7)	0.3% (2)	0.0% (0)	--	9	0.07% (8)	0.02% (2)	0.0% (0)	--	10
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	1.1% (7)	2.0% (13)	0.3% (2)	22	--	0.1% (11)	0.2% (27)	0.02% (3)	41
25-35	--	2.7% (18)	3.0% (20)	0.2% (1)	39	--	0.4% (45)	0.4% (47)	0.0% (1)	93
35-45	--	3.5% (23)	2.9% (19)	0.2% (1)	43	--	0.3% (39)	0.5% (59)	0.03% (4)	102
45+	--	5.5% (36)	2.3% (15)	0.8% (5)	56	--	0.7% (78)	0.5% (56)	0.06% (7)	141
Adult	--	1.1% (7)	1.0% (6)	1.0% (6)	19	--	0.2% (22)	0.1% (13)	0.2% (21)	56
Total	18	93	73	12	196	40	197	202	36	475

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

A higher percentage of males (28.1%; 174 individuals) than females (23.6%; 89 individuals) were recorded with at least one leg bone being affected by periostitis (Table 4.5). A lower percentage of adults of undetermined sex were recorded with periostitis (19.5%; 26 individuals) and an even lower percentage in juveniles (5.4%; 11 individuals).

Table 4.5 Age and Sex Distribution for Non-Specific Infection: Corrected and Elements-wise Prevalence.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.2%					0.04%				
	(2)	--	--	--	2	(2)	--	--	--	2
2-6	0.2%					0.04%				
	(2)	--	--	--	2	(2)	--	--	--	2
6-10	0.1%					0.02%				
	(1)	--	--	--	1	(1)	--	--	--	1
10-17	0.5%	0.2%	0.0%			0.1%	0.07%	0.0%		
	(6)	(2)	(0)	--	8	(8)	(4)	(0)	--	12
Juvenile	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%		
	(0)	(0)	(0)	--	0	(0)	(0)	(0)	--	0
17-25		1.4%	0.8%	0.0%			0.8%	0.4%	0.0%	
	--	(16)	(9)	(0)	25	--	(44)	(24)	(0)	68
25-35		2.7%	1.6%	0.0%			0.1%	1.0%	0.0%	
	--	(30)	(18)	(0)	48	--	(70)	(52)	(0)	122
35-45		4.5%	1.5%	0.0%			2.5%	0.7%	0.0%	
	--	(50)	(17)	(0)	67	--	(136)	(37)	(0)	173
45+		5.1%	2.5%	0.3%			2.9%	1.3%	0.1%	
	--	(56)	(28)	(3)	87	--	(157)	(69)	(6)	232
Adult		1.8%	1.5%	2.1%			0.8%	0.7%	0.9%	
	--	(20)	(17)	(23)	60	--	(43)	(40)	(49)	132
Total	11	174	89	26	300	13	454	222	55	744

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

As only adults were documented for osteoarthritis, no juveniles are included in Table 4.6. Females had the highest percentage of recorded joint surfaces showing evidence of possible osteoarthritis, with 22.8% of individuals being affected (86 individuals). Of the males with at least one joint surface surviving, 19.7% were recorded with signs of osteoarthritis (122 individuals) but only 4.5% of adults of undetermined sex were found to have evidence (6 individuals).

Table 4.6 Age and Sex Distribution for Osteoarthritis Corrected and Elements-wise Prevalence

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
17-25		0.2%	0.6%	0.07%			0.02%	0.1%	0.0%	
	--	(3)	(8)	(1)	12	--	(3)	(10)	(0)	13
25-35		1.0%	0.6%	0.0%			0.2%	0.1%	0.0%	
	--	(12)	(8)	(0)	20	--	(25)	(18)	(0)	43
35-45		2.3%	1.0%	0.0%			0.3%	0.2%	0.0%	
	--	(29)	(12)	(0)	41	--	(45)	(29)	(0)	74
45+		5.2%	3.5%	0.3%			1.3%	1.1%	0.08%	
	--	(65)	(44)	(4)	113	--	(180)	(158)	(12)	350
Adult		1.0%	1.1%	0.07%			0.1%	0.1%	0.0%	
	--	(13)	(14)	(1)	28	--	(20)	(18)	(1)	39
Total		122	86	6	214		273	233	13	519

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The prevalence rates for maxillary sinusitis are much lower than the above health indicators (Table 4.7). Females had the highest percentage with recorded evidence of maxillary sinusitis, with 3.2% of individuals with surviving sinuses showing signs of possible maxillary sinusitis (15 individuals). No adults of undetermined sex were recorded with signs of maxillary sinusitis and only 2.7% of males (24 individuals) and 2% of juveniles (4 individuals) had any indication of.

Table 4.7 Age and Sex Distribution for Maxillary Sinusitis: Corrected Prevalence

	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0
2-6	0.2% (2)	--	--	--	2
6-10	0.1% (1)	--	--	--	1
10-17	0.1% (1)	0.1% (1)	0.0% (0)	--	2
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	0.2% (2)	0.2% (2)	0.0% (0)	4
25-35	--	0.6% (5)	0.1% (1)	0.0% (0)	6
35-45	--	0.5% (4)	0.2% (2)	0.0% (0)	6
45+	--	1.2% (10)	1.1% (9)	0.0% (0)	19
Adult	--	0.2% (2)	0.1% (1)	0.0% (0)	3
Total	4	24	15	0	43

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Similarly, the rates of trauma were lower than some of the previous health indicators, with only 6.3% of males showing any evidence of a trauma (39 individuals) and only 5.3% of females (20 individuals). Adults of undetermined sex had only a 1.5% prevalence rate (2 individuals) and only 1% of juveniles (2 individuals) showed evidence of trauma (Table 4.8).

Table 4.8 Age and Sex Distribution for Trauma: Corrected and Elements-wise Prevalence

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0%					0.0%				
	(0)	--	--	--	0	(0)	--	--	--	0
2-6	0.0%					0.0%				
	(0)	--	--	--	0	(0)	--	--	--	0
6-10	0.0%					0.0%				
	(0)	--	--	--	0	(0)	--	--	--	0
10-17	0.2%	0.0%	0.0%			0.03%	0.0%	0.0%		
	(2)	(0)	(0)	--	2	(4)	(0)	(0)	--	4
Juvenile	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%		
	(0)	(0)	(0)	--	0	(0)	(0)	(0)	--	0
17-25		0.0%	0.1%	0.0%			0.0%	0.0%	0.0%	
	--	(0)	(1)	(0)	1	--	(0)	(0)	(0)	0
25-35		0.3%	0.4%	0.0%			0.03%	0.1%	0.0%	
	--	(3)	(5)	(0)	8	--	(3)	(6)	(0)	9
35-45		0.7%	0.3%	0.0%			0.1%	0.03%	0.0%	
	--	(9)	(3)	(0)	12	--	(10)	(3)	(0)	13
45+		1.5%	0.6%	0.0%			0.2%	0.1%	0.0%	
	--	(18)	(7)	(0)	25	--	(23)	(10)	(0)	33
Adult		0.7%	0.3%	0.2%			0.1%	0.1%	0.02%	
	--	(9)	(4)	(2)	15	--	(14)	(6)	(2)	22
Total	2	39	20	2	63	4	50	25	2	81

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

As with osteoarthritis, only adults were included in the calculations regarding DISH, as it is a condition that only affects adults. There was a higher prevalence rate of DISH in males (4.2%; 26 individuals) than females (1.3%; 5 individuals) (Table 4.9).

Table 4.9 Age and Sex Distribution for DISH: Corrected and Elements-wise Prevalence

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
25-35	--	0.3%	0.0%	0.0%		--	0.1%	0.0%	0.0%	
		(3)	(0)	(0)	3		(14)	(0)	(0)	14
35-45	--	0.0%	0.1%	0.0%		--	0.0%	0.0%	0.0%	
		(0)	(1)	(0)	1		(0)	(4)	(0)	4
45+	--	2.2%	0.3%	0.0%		--	0.8	0.1%	0.0%	
		(20)	(3)	(0)	23		(124)	(15)	(0)	139
Adult	--	0.3%	0.1%	0.0%		--	0.1%	0.03%	0.0%	
		(3)	(1)	(0)	4		(15)	(5)	(0)	20
Total	--	26	5	0	31	--	153	24	0	177

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The health indicator with the lowest overall prevalence rate was rib periostitis. Only 1.8% of males were affected (10 individuals) and 1.5% of juveniles (3 individuals) (Table 4.10). No females or

adults of undetermined sex were recorded as having any indication of rib periostitis.

Table 4.10 Age and Sex Distribution for Rib Periostitis: Corrected Prevalence Rates

	J	M	F	U	T
0-2	0.0%	--	--	--	
	(0)				0
2-6	0.2%	--	--	--	
	(2)				2
6-10	0.1%	--	--	--	
	(1)				1
10-17	0.0%	0.0%	0.0%	--	
	(0)	(0)	(0)		0
Juvenile	0.0%	0.0%	0.0%	--	
	(0)	(0)	(0)		0
17-25	--	0.1%	0.0%	0.0%	
		(1)	(0)	(0)	1
25-35	--	0.6%	0.0%	0.0%	
		(5)	(0)	(0)	5
35-45	--	0.2%	0.0%	0.0%	
		(2)	(0)	(0)	2
45+	--	0.1%	0.0%	0.0%	
		(1)	(0)	(0)	1
Adult	--	0.1%	0.0%	0.0%	
		(1)	(0)	(0)	1
Total	3	10	0	0	13

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The following section provides an overview of the data from artefactual and documentary evidence for the eight sites included in this study. The evidence resulting from these eight sites will then be discussed individually before comparing the different types of monastic sites.

4.1.2 Artefacts

A breakdown of the total artefact assemblage can be found in Table 4.11 and Figure 4.2. The largest artefact class, both for combined and each individual site, is that of the Dress Accessories (55% or 1012). This class includes items such as buckles, pins, lace ends, shoes, etc. The next largest group is the Household class, which makes up 21% (381) of the total assemblage. It is made up of items that would have been used for household activities, cooking primarily, but also some craftwork.

The Money artefact class, made up of jettons and coins, is the next largest class. Artefacts relating to religion, including pilgrim badges, crosses, beads, etc., make up the next largest group. Hygiene (58) and Jewellery (55) follow close behind with 3% of the total each, artefacts relating to reading and writing (30), textile work (45), and other industrial or agricultural activities (42) make up 2% of the total each.

Artefacts relating to riding and/or owning horses follows as 1% (22), as do artefacts relating to playing games (12). The final two classes, Music and Weapons, make up less than 1% of the total, contributing only seven artefacts each. This equates to 0.4% of the total.

Table 4.11 Artefact Assemblage for all sites

Artefact Class	St Mary's Nunnaminster	Clementhorpe Priory	St James' Priory	Priory of St Andrew	Hull Austin Friars	Elstow Abbey	Sinningthwaite Priory	Hulton Abbey	Total
Dress Accessories	67	39	2	57	255	547	4	41	1012
Gaming	1	2	0	0	6	3	0	0	12
Horse	0	0	0	0	2	19	0	1	22
Household	12	32	0	35	75	222	1	6	381
Hygiene	3	2	0	39	6	8	0	0	58
Jewellery	6	8	2	5	13	21	0	0	55
Money	8	19	2	0	28	41	0	8	106
Music	0	0	0	0	4	3	0	0	7
Religious	13	2	0	21	15	9	0	9	69
Textile	4	0	0	9	8	22	0	0	45
Industrial Tools	0	2	0	21	8	9	1	1	42
Weapons	0	0	0	3	1	3	0	0	7
Writing/Reading	2	2	0	0	16	4	0	6	30
Total	116	108	6	190	437	911	6	72	1846

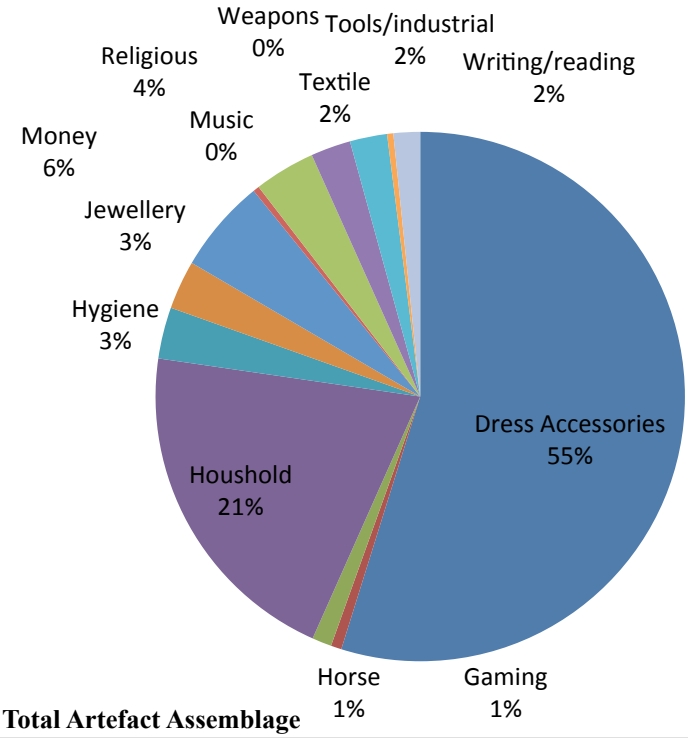


Figure 4.2 Total Artefact Assemblage

There were several artefacts that could be argued to indicate high status or access to wealth, but

these will be discussed in relation to each individual site.

4.1.3 Documents

The overall, combined value of seven of the eight sites in this study at Dissolution was £818 8s and 10¾d (Hull Friary was not included in the VE). This value was based on the records and information included in the *Valor Ecclesiasticus* (see Table B80 in Appendix B). This valuation was put together using, in part, the spiritual and temporal holdings of the monasteries and nunneries, a total of 80 properties.

According to a study conducted by the Jurkowski and Ramsay, these sites (over the course of their existence) own a total of at least 200 different properties spread over approximately 15 different counties (Jurkowski and Ramsay, 2007a; Jurkowski and Ramsay, 2007b). This included at least 51 churches and 46 manors, as well as a variety of granges, urban properties, chapels and other holdings. It is unclear how many acres this would have encompassed.

The information regarding the pension amounts granted to the monks and nuns from the sites at the Dissolution comes predominately from the VE, although some of the information was recorded in other contemporary documents and was accessed through the Victorian County Histories via the British History Online website. The breakdown of this information is found in Table B80 in Appendix B. The combined pensions for the two abbesses and one abbot was £96 13s 4d. The combined pensions for the four prioresses and two priors was £43 10s 0d. The 85 individuals, including the abbots, abbesses, priors, prioresses, monks and nuns, left in these institutions at Dissolution split a pension pot of £247 4s 3d.

Between the period of 1270-1530, there were a total of 11 apostate monks and nuns recorded as leaving the eight sites included in this research (Logan, 1996). Hull Austin Friary and St James' Priory, Bristol had no recorded apostates. The breakdown of these 11 individuals will be discussed below in each section relating to the financial documents associated with the sites.

The following four sections will discuss the results of the comparisons between the four groups: Nunneries and Monasteries; Northern and Southern Houses; Urban and Rural Houses; Older and Reform Orders. Given the scope of this research and its restrictions, only those health indicators, artefact classes and documentary information that were found to be statistically significant will be discussed in any depth. The other, non-significant results can be found in Appendix B The first group to be discussed will be the group originally set to be the primary focus of this research, the differences between the quality of life at monasteries and nunneries.

4.2 Nunneries and Monasteries

Following the format above, the differences in artefact assemblages will first be discussed, followed by health indicators and finally the documentary evidence. The overall breakdown of the statistically significant differences is in Table 4.12.

Table 4.12 Results of Statistical Comparison of Nunneries and Monasteries

	X^2	p	Higher Rate
Dress Accessories	9.58	1.97E-03	Nunneries
Horse	5.72	0.02	Nunneries
Household	12.19	4.80E-04	Nunneries
Hygiene	39.16	3.91E-10	Monasteries
Religious	22.01	2.71E-06	Monasteries
Tools/Industrial	27.13	1.91E-07	Monasteries
Writing/Reading	15.86	6.82E-05	Monasteries
Calculus Elements-wise Prevalence	2271.64	0.00E00	Nunneries
Calculus Corrected Prevalence	171.25	2.70E-40	Nunneries
Caries Elements-wise Prevalence	145.53	1.65E-33	Nunneries
Caries Corrected Prevalence	24.18	8.6E-07	Nunneries
Maxillary Sinusitis Corrected Prevalence	3.79	0.05	Nunneries
Osteoarthritis Elements-wise Prevalence	645.94	1.71E-142	Nunneries
Osteoarthritis Corrected Prevalence	97.00	6.93E-23	Nunneries
Dissolution Gross Valuation from all houses recorded in the Monas. Angli.*	F(2,447)=21.45	p<0.00	Monasteries

***compared using ANOVA not chi-squared**

4.2.1 Health Indicators

The demographic profiles of the populations from the nunneries and monasteries can be found below in Figures 4.3 and 4.4. Both populations are primarily comprised of adults with the Older (45+) age category being the largest (85 or 27.6% individuals of the nunnery population; 203 or 25% individuals of the monastery population), when the Adult age category is excluded (76 or 24.7% individuals of the nunnery population; 214 or 26.3% individuals of the monastery population). The nunnery populations have slightly more individuals in the 25-35 age category (58 or 18.8%) than the 35-45 age category (54 or 17.5%), with the 17-25 category (35 or 11.4%) being the smallest of the adult age groups. The monastery population also has the 17-25 category (68 or 8.4%) making up the smallest group, while the 35-45 age category (174 or 21.4%) is slightly larger than the 25-35 group (156 or 19.1%).

The sex distribution of the two groups is exactly what would be expected of the two populations. There are more males than females in the monastery population (2.68:1) and more females than males in the nunneries population (1.74:1).

The distribution of the sexes in the nunneries and monasteries is as would be expected (Table

4.10.4). In the nunneries, the females outnumber the males in almost every age category, the only exception being the Older (45+) category. In the monasteries, the males outnumber the females in every age category. Only in the Adult category are the males outnumbered i.e. those adults whose sex could not be determined.

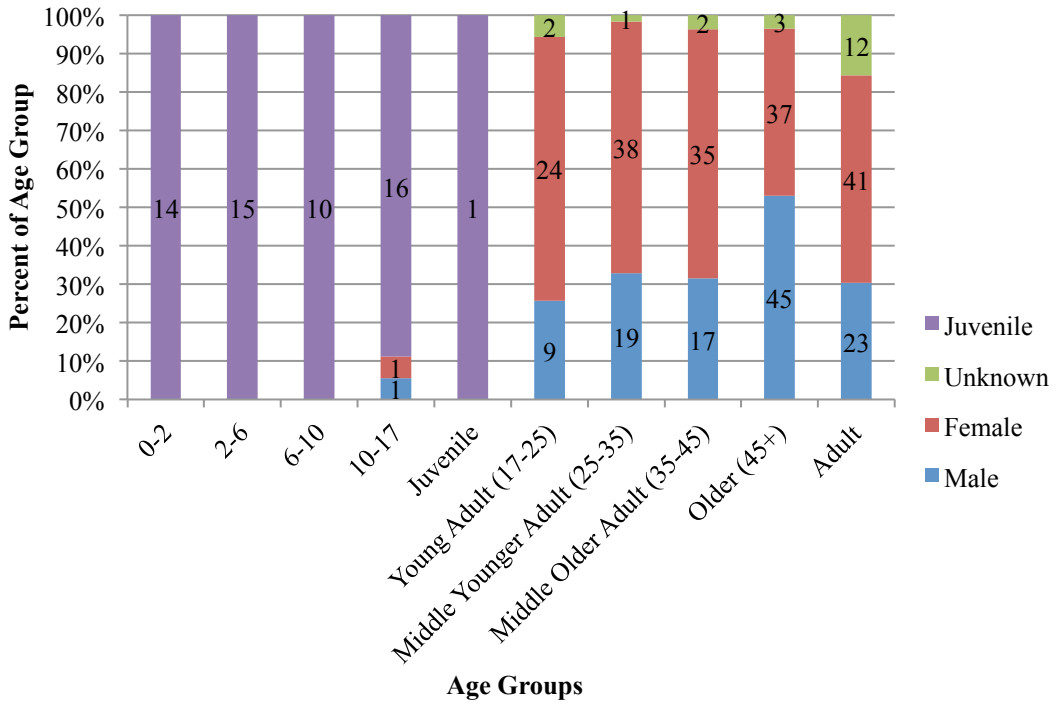


Figure 4.3: Demography for Nunneries Population

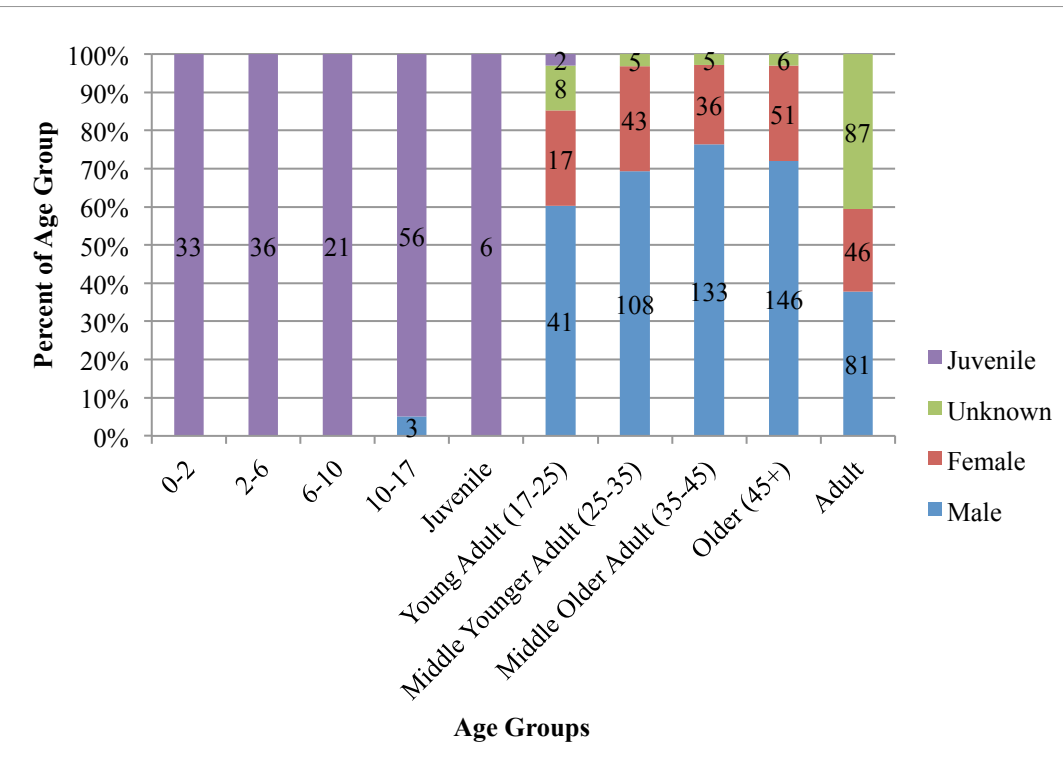


Figure 4.4: Demography for Monasteries Population

Four health indicators were found to have statistically significant differences in prevalence rates between the skeletal populations from the nunneries and monasteries. For all four, the prevalence rates were found to be higher in the nunnery population (see Table 4.12). These included the corrected and element-wise prevalence rates for calculus (Figure 4.4), dental caries (Figure 4.5) and osteoarthritis (Figure 4.6), as well as the corrected prevalence rates for maxillary sinusitis (Figure 4.7).

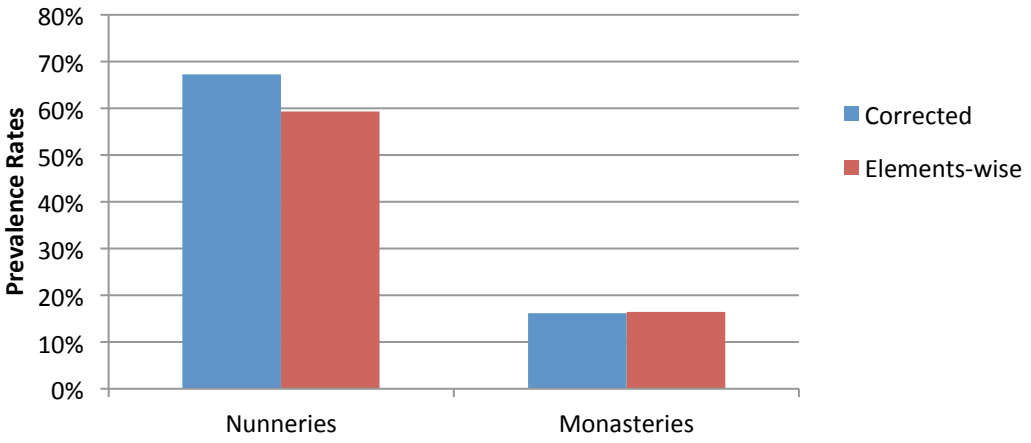


Figure 4.4: Dental Calculus Prevalence Rates for Nunneries and Monasteries

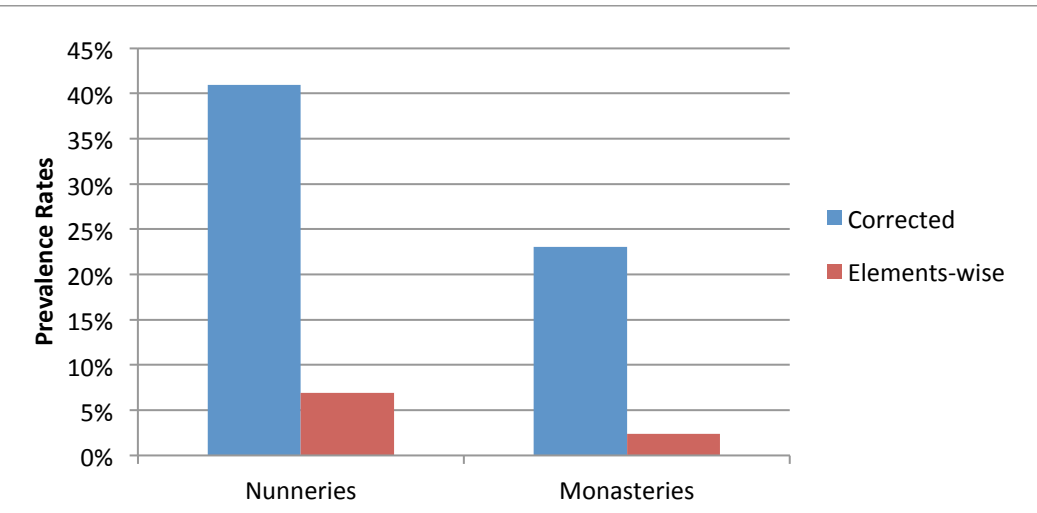


Figure 4.5: Dental Caries Prevalence Rates for Nunneries and Monasteries

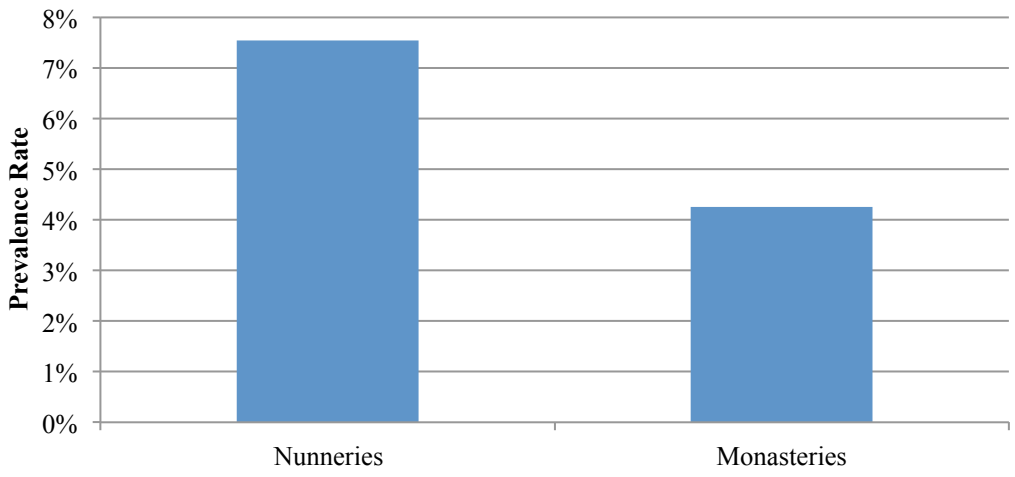


Figure 4.6: Maxillary Sinusitis Corrected Prevalence Rates for Nunneries and Monasteries

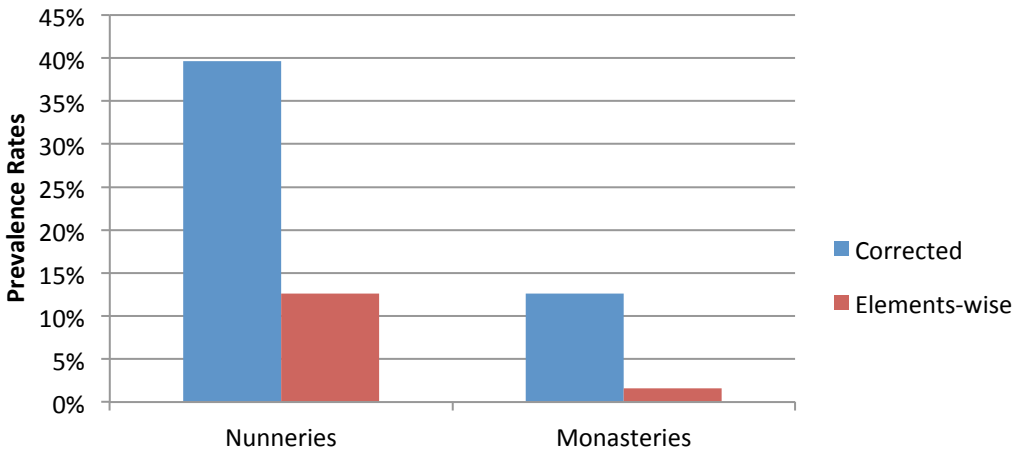


Figure 4.7: Osteoarthritis Prevalence Rates for Nunneries and Monasteries

The prevalence rates for osteoarthritis for each individual joint (Table 4.13) were also calculated and compared using chi-squared tests. The results of this can be found in Figure 4.8.

Table 4.13 Chi-squared values for Osteoarthritis Prevalence Rates by Joint for Nunneries and Monasteries

Joint	X^2	p
TMJ	7.87	0.01
Spine	251.25*	1.39E-56
Shoulders	156.21*	7.63E-36
Elbows	31.71*	1.79E-08
Wrists	16.79	4.19E-05
Sacroilliac	4.96	0.03
Hips	211.43*	6.69E-48
Knees	76.36*	2.37E-18
Ankles	13.98	1.85E-04

***chi-squared values that were worked out using the Pearson 2001 website**

All joints were found to have had statistically significant differences in the prevalence rates for OA

between nunneries and monasteries. Nunneries were found to have had higher prevalence rates for all joints analysed. In both the monastery and nunnery populations, the spine was the most common area of the body to be affected by osteoarthritis, with 5.56% (41) of individuals with at least one vertebra affected in monasteries and 52.57% (92) in nunneries.

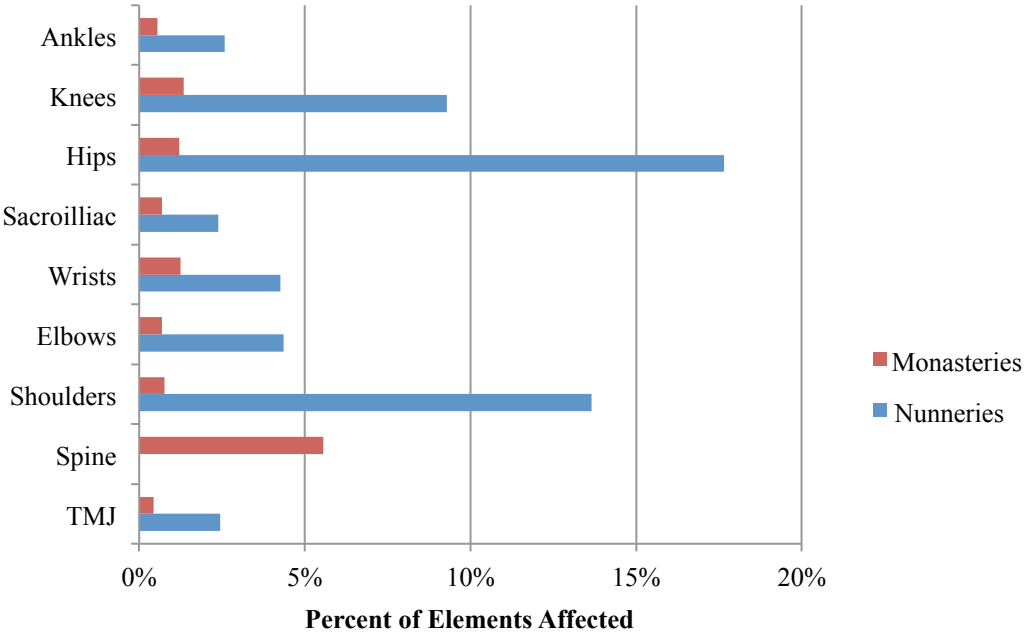


Figure 4.8: Osteoarthritis Prevalence Rates by Joint for Nunneries and Monasteries

*The rates of OA in the spine for the nunneries has been removed for formatting reasons.

4.2.2 Artefact Assemblages

Seven artefact classes, out of thirteen, were found to appear in the artefact assemblages in significantly different proportions in the assemblages of the combined nunneries and monasteries.

Table 4.14 Number of Artefacts in the Artefact Classes for Nunneries and Monasteries

	Nunneries	**Monasteries**
Dress Accessories	657	355
Gaming	6	6
Horse	19	3
Household	265	116
Hygiene	13	45
Jewellery	35	20
Money	68	38
Music	3	4
Religious	24	45
Textile	28	17
Timekeeping	0	1
Tools/industrial	12	30
Weapons	3	4
Writing/reading	8	22
Total	**1141**	**706**

The breakdown of the artefact assemblages for nunneries and monasteries can be found in Table 4.14 and Figures 4.9 and 4.10. Out of the seven, three classes appear in higher proportions for the nunnery sites and four in the monastery sites. The three classes that have higher proportions in the nunnery assemblage are the Dress Accessories, Horse and Household. The four classes that have higher proportions in the monastery assemblage are the Hygiene, Religious, Tools/Industrial and Writing/Reading.

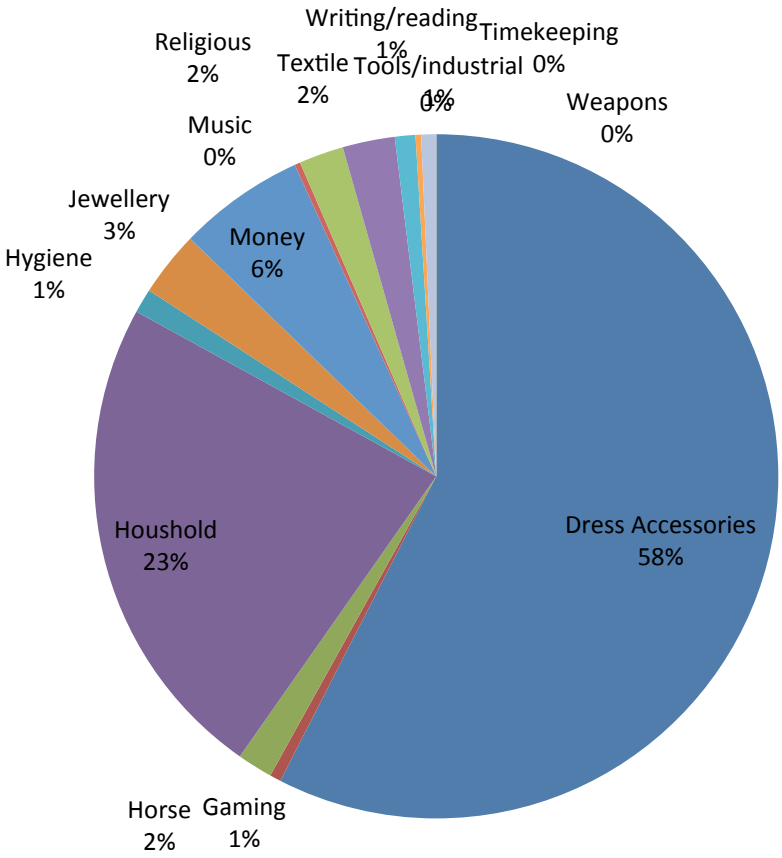


Figure 4.9: Combined Artefact Assemblage for Nunneries

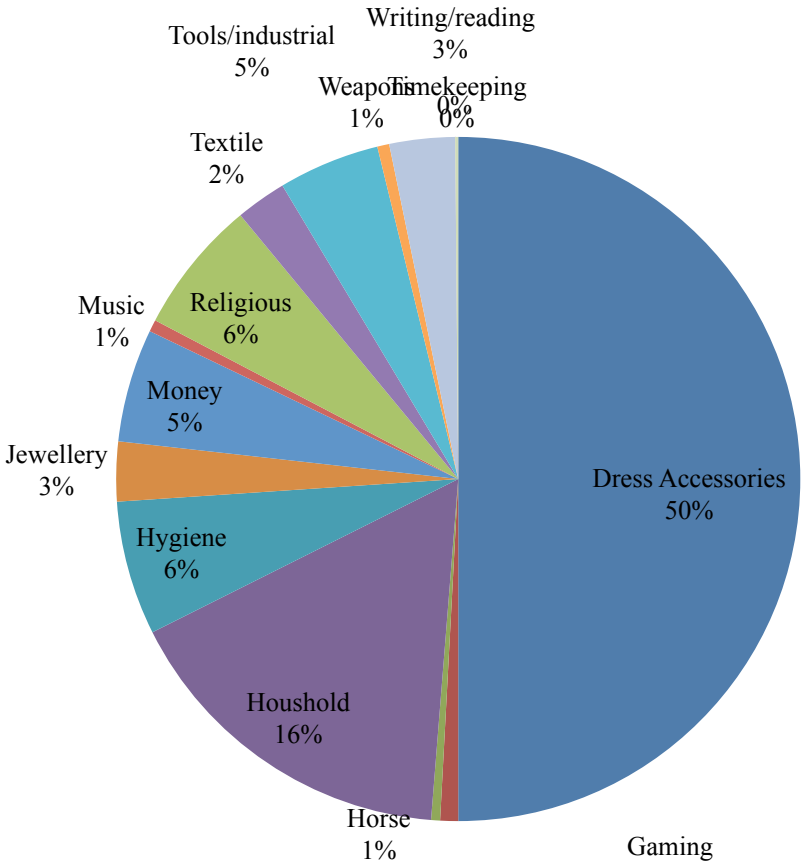


Figure 4.10: Combined Artefact Assemblage for Monasteries

The differences in the types of high status artefacts between the nunneries and monasteries in this collection can be described as religious and personal (Table 4.15). The majority of the high status artefacts from the nunneries in this collection were items of jewellery or personal adornment. There were, however, three rosary beads that indicate high status associated with the nunneries that would have been items used in prayer. The majority of high status artefacts associated with the monasteries were religious items.

Table 4.15: High Status Artefacts for Nunneries and Monasteries

Nunneries	Monasteries
Zoomorphic vessel lid	Swords (3)
Gold and silver finger rings	Jet bead
Gold pendant	Glass bead
Gold brooch	Amber beads
Glass button	Jet crucifix
Silver thimble	Toothbrushes
Jet bead	Religious badges
Blue glass bead	Beeswax chalice
Amethyst bead	
Tortoise shell comb	

4.2.3 Dissolution Valuation and Pensions

When comparing the 446 monastic houses in the *Monasticon Anglicanum* with recorded

Dissolution values using the ANOVA test, it was found that the difference between the valuation of monasteries, nunneries, mixed houses and hospitals was statistically significant ($F(3,446)=21.45$, $p<0.00$). Using the Tukey Post-Hoc test, the exact relationship between the different types of religious houses could be established. It was found that the differences in valuation between monasteries and nunneries and monasteries and hospitals were statistically significant (see Table 4.16). Looking at the average valuation, it would appear that, on average, monasteries had the highest valuation, followed by mixed houses, then nunneries, with hospitals having the lowest average Dissolution value.

Table 4.16 Results of the Tukey Post-Hoc Test Comparing Nunneries and Monasteries

Monasteries	Nunneries	$p<0.00$
Monasteries	Mixed Houses	$p=0.99$
Nunneries	Mixed Houses	$p=0.39$
Hospitals	Mixed Houses	$p=0.31$
Monasteries	Hospitals	$p<0.00$
Nunneries	Hospitals	$p=0.96$

The eight sites in this study do not, however, follow this model. Although not all of the information is available for all the categories in Table 4.17 for all sites, the average gross value at Dissolution is higher for the nunneries, as is the pension granted to the Abbess or Abbot. However, the average pension granted to the prior and prioress and the average monk or nun was higher at monasteries. Much of this could be biased, however, by the fact that no valuation is recorded for the Hull Austin Friars, that only Elstow Abbey had a high enough income to protect it from the first dissolution, and that Nunnaminster has the second highest income, a full £90 higher than the next highest income.

Table 4.17 Average Pensions and Dissolution Values for Nunneries and Monasteries

	Average Abbess/Abbots Pension	Average Prioress/Prior Pension	Average Approx. Pension	Average Total gross value at dissolution
Nunneries	38.00	4.75	3.43	161.25
Monasteries	20.00	11.50	4.33	56.33

All values in pounds (£).

There were seven apostates recorded from the four nunneries included in this research and four from the monasteries. Of the seven apostate nuns, one was pregnant (Margaret de Burton of Sinningthwaite Priory, 1343) and another was willingly abducted, but returned pregnant (Isobel Graves of Nunnaminster, 1370) (Logan, 1996, 263 and 259).

4.2.4 Summary of Results

In summary, the nunneries in this study had a higher average value at Dissolution as well as a higher average pension for the abbess. There were also higher proportions of artefacts relating to clothing, horses and household activities. The individuals buried at the nunneries had higher prevalence rates of dental calculus, dental caries, maxillary sinusitis and osteoarthritis. In comparison, the monasteries had higher pensions for the priors as well as the average monk. There

were also artefacts relating to hygiene, crafts and agricultural activities, and writing and reading as well as religious paraphernalia found in higher proportions at monasteries. There were no health indicators that were higher in prevalence at the monasteries.

The ways in which these patterns of significance could reflect a potential difference in the quality of life experienced by monks and nuns in medieval England will be discussed in the following chapter. As has been discussed above, the quality of life of these individuals would have been influenced by a variety of factors. The following section will report the patterns of significance found when the same eight religious houses were compared along regional lines.

4.3 Northern and Southern Houses

In comparing the religious houses by their regional location, it is important to note that the aim is to evaluate differences in quality of life based on environmental and climatic differences (discussed in section 5.3), rather than on socio-political ones. This is not an attempt to argue that the modern ideas about socio-cultural differences between the two regions were similar in the medieval period. The goal is to assess the impact of the differences in climate and weather and agricultural conditions. Ideally, a similar comparison would have been made for the differences in the East and the West of England, but it was not possible to identify eight sites that would have included this additional criterion along with the other four.

Table 4.18 Results for Statistical Comparison of Northern and Southern Sites

Significant	X^2	p	Higher Rate
Dress Accessories	23.86	1.04E-06	Southern
Horse	8.85	2.94E-03	Southern
Hygiene	42.10	8.69E-11	Northern
Money	9.37	2.20E-03	Northern
Religious	6.82	0.01	Northern
Tools/Industrial	16.08	6.07E-05	Northern
Writing/Reading	5.10	0.02	Northern
Calculus Elements-wise Prevalence	297.69	1.05E-66	Southern
Caries Elements-wise Prevalence	4.96	0.03	Northern
Maxillary Sinusitis Corrected Prevalence	14.50	1.41E-04	Northern
Non-Specific Infection Elements-wise Prevalence	139.71	3.07E-32	Northern
Non-Specific Infection Corrected Prevalence	49.64	1.85E-12	Northern
Trauma Elements-wise Prevalence	7.88	5.00E-03	Northern
Trauma Corrected Prevalence	8.94	2.78E-03	Northern
Dissolution Gross Valuation from all houses recorded in the Monas. Angli.*	F(2,447)=18.32	p<0.00	Southern

***compared using ANOVA not chi squared**

Table 4.18 shows a breakdown of the areas in which Northern and Southern houses were found to differ significantly. There were seven artefact classes that differed significantly in their

proportional contribution to the overall assemblages, and four health criteria, which were found to have significantly different prevalence rates within the two populations. In addition to these, the gross valuations, as recorded in the *Monasticon Anglicanum*, of Northern and Southern houses were found to be significantly different.

This section will first present the differences in the artefact assemblages, followed by an outline of the differing health indicators, and finish with an overview of the differences in the value of Northern and Southern sites and the pensions granted to those living in them.

4.3.1 Health Indicators

The demographic profiles for both the Northern and Southern populations can be found in Figures 4.29 and 4.30. While both populations are made up of a majority of adults, the ratio of juvenile to adult is lower in the Southern populations. The 10-17 age category (60 or 8.8%), however, does outnumber the 17-25 age category (54 or 8.0%) for the Northern population. When the 'Adult' age category is excluded, the Older (45+) category is the largest for both the Northern (224 or 33.0%) and Southern (64 or 30.0%) populations. In the Northern population, this is followed by the 35-45 category (184 or 27.1%) and then the 25-35 category (157 or 23.1%). For the Southern population, the 25-35 age category (57 or 26.6%) is the second largest, followed by the 17-25 category (49 or 22.9%), the smallest adult category being the 35-45 category (44 or 20.6%).

The sex distribution of the two populations reflects the fact that there were more individuals found at the monasteries overall (970 vs. 366). Both groups have more males than females with a roughly two to one ratio from the Northern sites (1.74:1) and almost three to one from the South (2.68:1). A more in depth description of the sexes is found in Table 4.11.3.

With the exception of the Southern 17-25 age category, males outnumber females in every adult age category (Tables 4.11 and 4.12). The Southern population has a much higher number of adults of undetermined sex. Given that the population from the monasteries is higher than that of the nunneries, it is not surprising that males outnumber females overall.

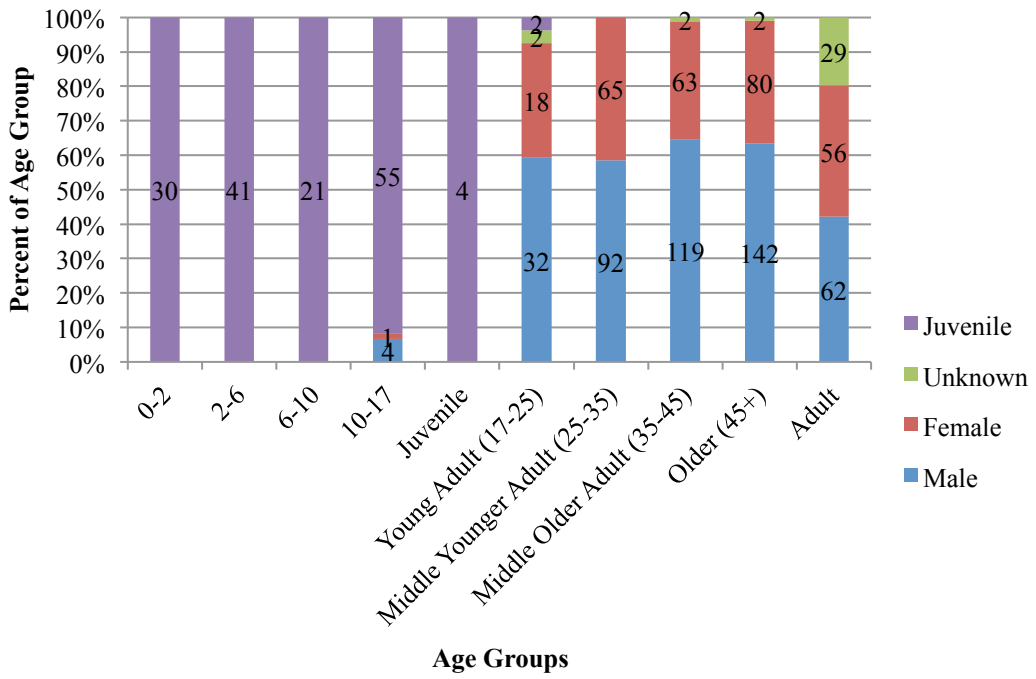


Figure 4.11: Demography for Northern Population

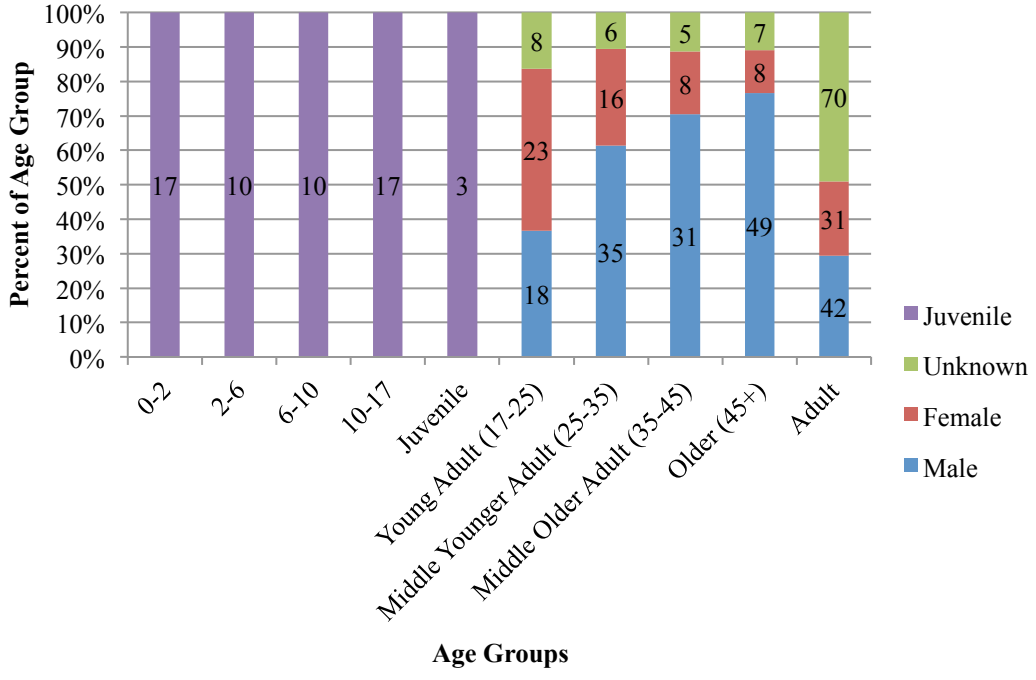


Figure 4.12: Demography for Southern Population

Out of a possible eight health indicators, there were significant differences in the prevalence rates in five of them. These include dental calculus, dental caries, non-specific infection and trauma. When comparing the prevalence rates of dental calculus it was found that there was a high rate in the Southern population (Table 4.13).

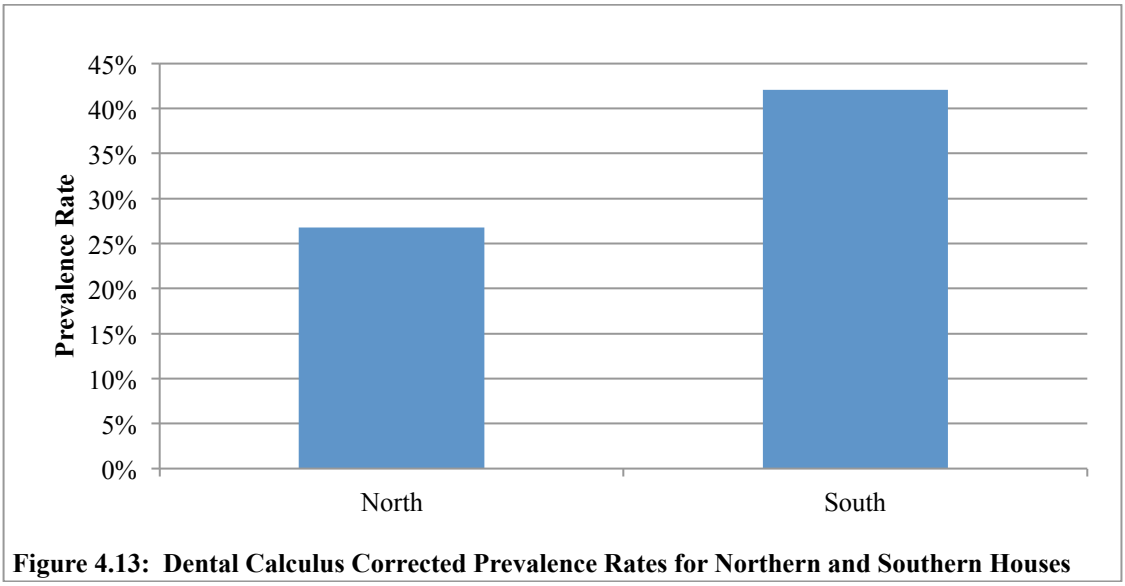


Figure 4.13: Dental Calculus Corrected Prevalence Rates for Northern and Southern Houses

In comparing the prevalence rates for dental caries, however, the Northern population had a significantly higher prevalence rate than the Southern population (Figure 4.14). For both dental calculus and caries, however, the differences in corrected prevalence rates were not found to be significant, where only the element-wise prevalence rates were significant.

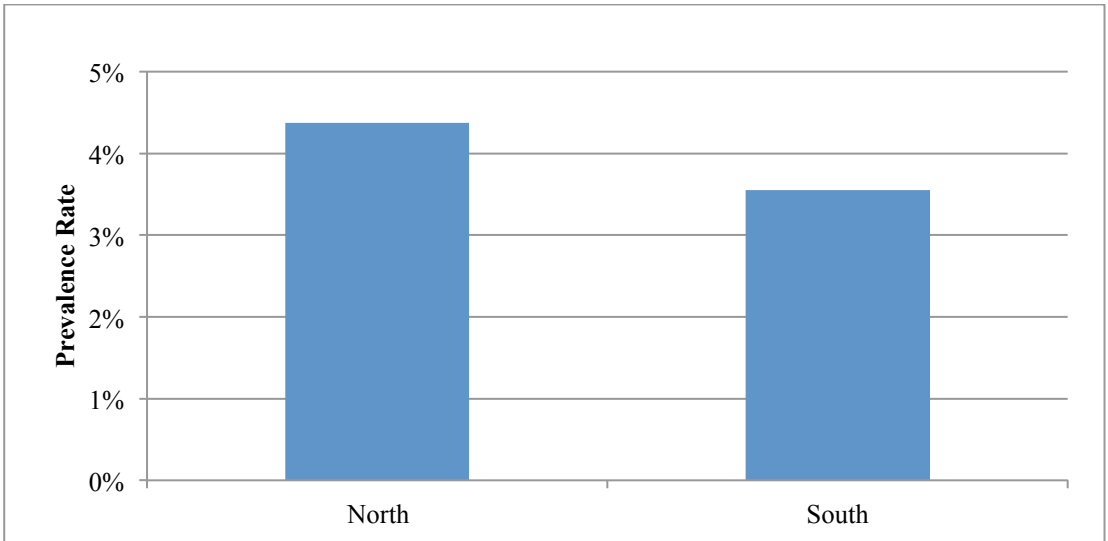


Figure 4.14: Dental Caries Corrected Prevalence Rates for Northern and Southern Houses

The differences in corrected prevalence rates for maxillary sinusitis were also found to be statistically significant. The Northern population had a much higher rate of sinusitis than the Southern population (Figure 4.15).

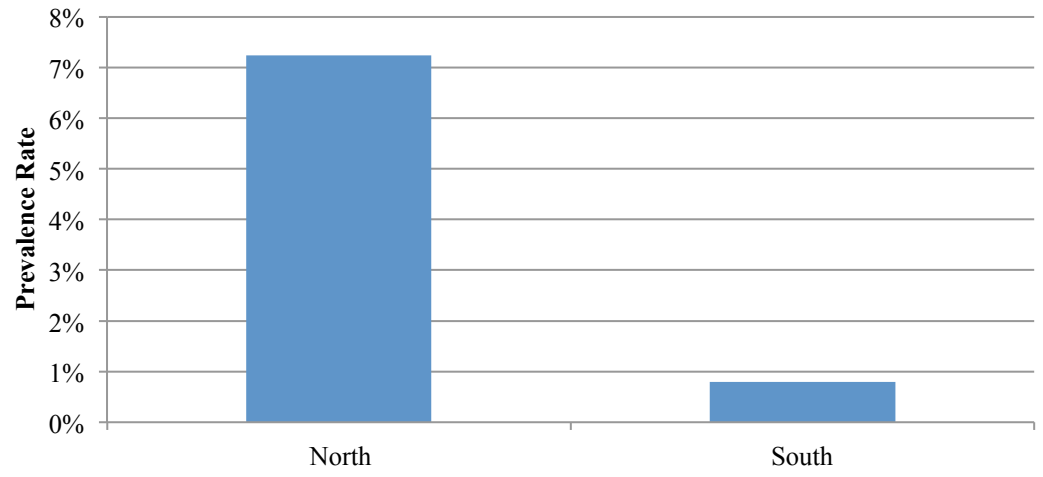


Figure 4.15: Maxillary Sinusitis Corrected Prevalence Rates for Northern and Southern Houses

Similarly, the Northern population had a significantly high prevalence rate (both corrected and element-wise) of non-specific infection than the Southern population (Figure 4.16).

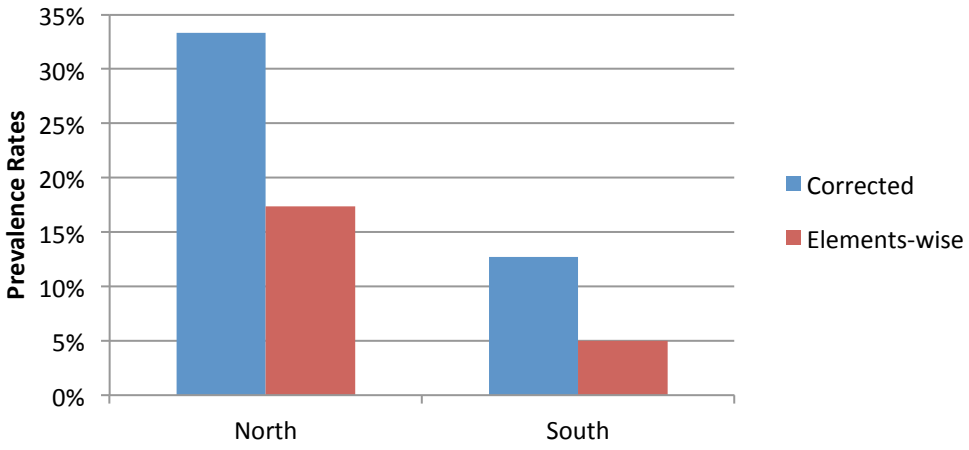


Figure 4.16: Non-Specific Infection Prevalence Rates for Northern and Southern Houses

This pattern is also seen in the prevalence rates for trauma in the two populations, where the Northern population has significantly higher prevalence rates for trauma than the Southern population, for both corrected and element-wise prevalence rates (Figure 4.17).

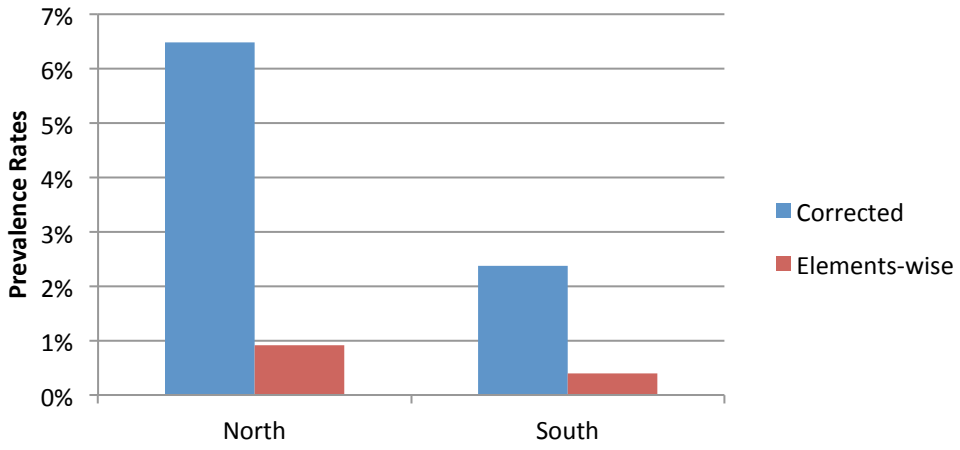


Figure 4.17: Trauma Prevalence Rates for Northern and Southern Houses

Although comparisons between corrected and element-wise prevalence rates for osteoarthritis in the Northern and Southern populations were not significant, the element-wise prevalence rates for four joints were found to be significantly different (Table 4.19). The Northern population has a significantly higher rate of osteoarthritis recorded in the hip joints (Figure 4.18). However, the prevalence rates of osteoarthritis in the ankles, wrists and spine were significantly higher in the Southern population.

Table 4.19 Chi-Squared values for Osteoarthritis Prevalence Rates by Joint for Northern and Southern Houses

Joint	X^2	p
TMJ	2.02	0.16
Spine	8.23	4.12E-03
Shoulders	0.24	0.62
Elbows	0.01	0.94
Wrists	4.68	0.03
Sacroilliac	2.20	0.14
Hips	19.63	9.38E-06
Knees	0.15	0.70
Ankles	13.01	3.10E-04

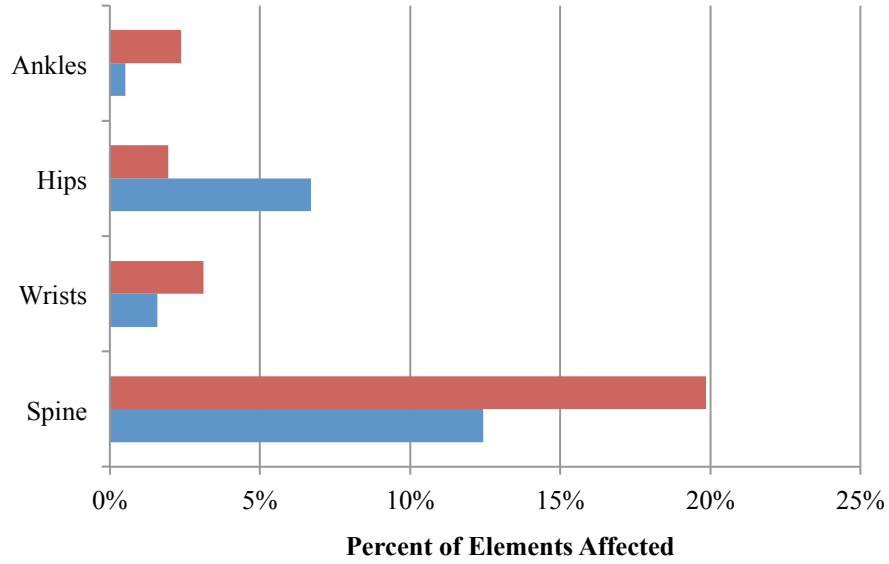


Figure 4.18: Elements-wise Prevalence Rates of Osteoarthritis by Joint for Northern and Southern Houses

4.3.2 Artefact Assemblages

As mentioned above, seven artefact classes were found in significantly different proportions at Northern and Southern houses. Two of these artefact classes, Dress Accessories and Horse, were found in higher proportion at Southern houses. The other five, Hygiene, Money, Religious, Tools/Industrial and Writing/Reading, were found in higher proportions at Northern Houses. The breakdown of the two artefact assemblages can be found in Table 4.20 and Figures 4.19 and 4.20.

Table 4.20 Number of Artefacts in the Artefact Classes for Northern and Southern Houses

	Southern	Northern
Dress Accessories	657	355
Gaming	4	8
Horse	20	2
Household	240	141
Hygiene	11	47
Jewellery	29	26
Money	59	47
Music	3	4
Religious	31	38
Textile	26	19
Timekeeping	1	0
Tools/industrial	10	32
Weapons	3	4
Writing/reading	12	18
Total	**1106**	**741**

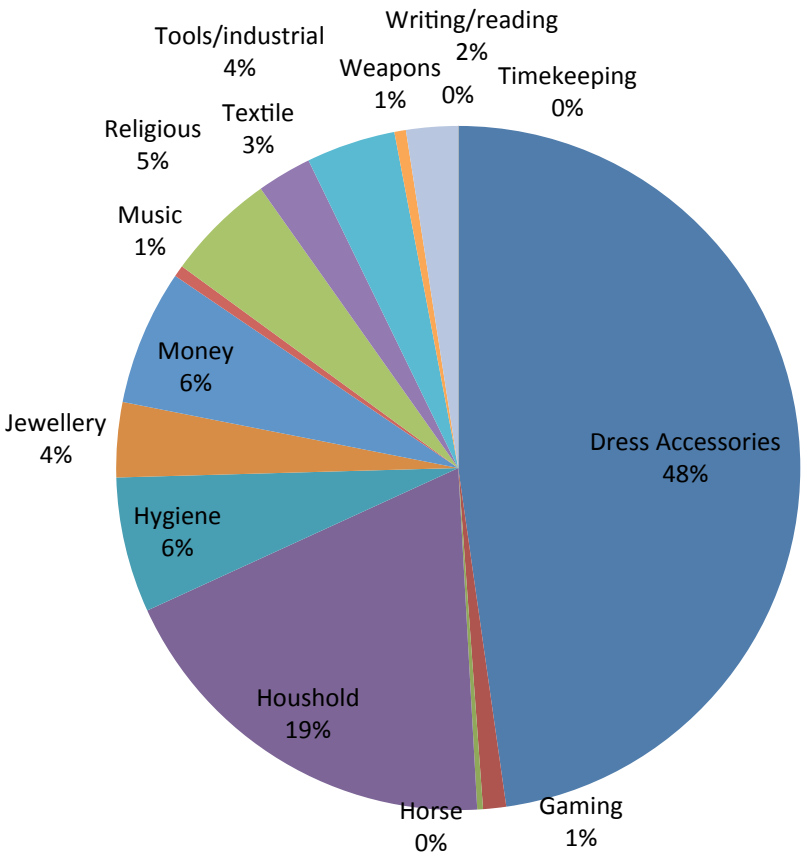


Figure 4.19: Artefact Assemblage for Northern Houses

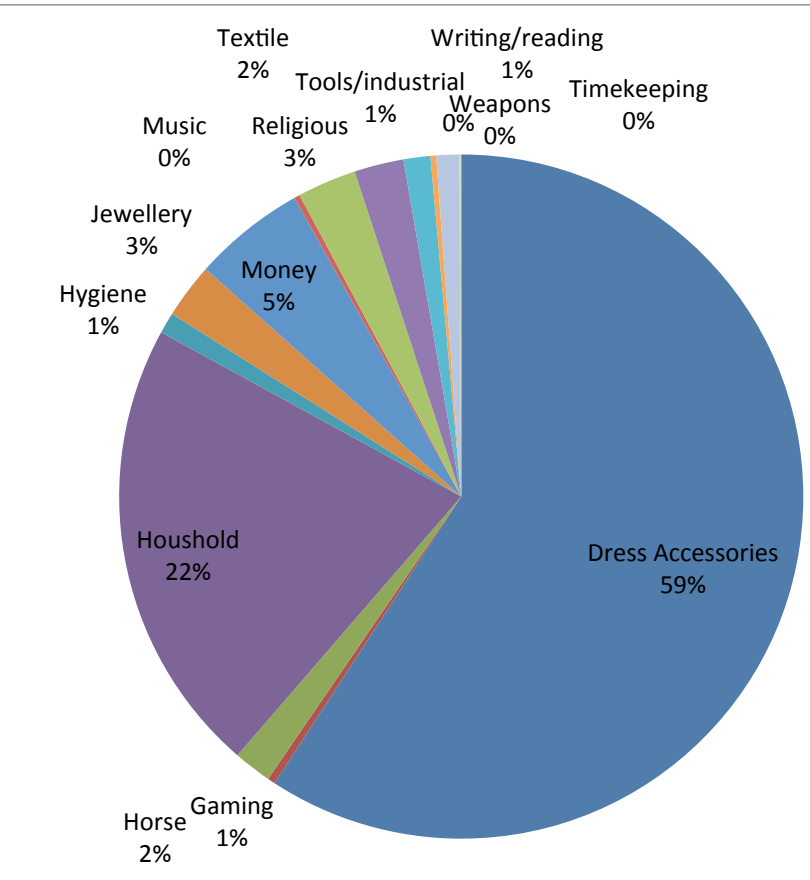


Figure 4.20: Artefact Assemblage for Southern Houses

The high status artefacts associated with the northern houses are a mix of artefacts with no clear unifying characteristics (Table 4.21). The southern houses' high status artefacts are a mix of religious and personal adornment.

Table 4.21: High Status Artefacts for Northern and Southern Houses

Northern	Southern
Swords (3)	Gold and silver finger rings
Zoomorphic vessel lid	Gold pendant
Jet bead	Gold brooch
Glass bead	Glass button
Amber bead	Silver thimble
Jet crucifix	Jet bead
Toothbrushes	Blue glass bead
	Amethyst bead
	Tortoise shell comb
	Religious badges
	Beeswax chalice
	Jet crucifix

4.3.3 Dissolution Valuation and Pensions

There were 447 religious houses recorded in the *Monasticon Anglicanum* for which their county and dissolution value (gross value) were included. From this, the region for which these houses could be included was deduced. Unlike the rest of this section, the Midlands region was isolated for attention because, with the wealth of information available, it allowed for a higher level of detail to be considered. The Midlands region was defined as anything south of the River Humber and Merseyside but north of Somerset and East Anglia, and the Northern and Southern regions were defined in relation to this region.

Table 4.22 Results of the Tukey Post-Hoc Test Comparing Northern and Southern Houses

F(2,447)=18.32	**p<0.00**
South:North	p<0.00
South:Midlands	p<0.00
Midlands:North	p=0.55

The values of the houses within these regions were found to be statistically significant (Table 4.22) when compared using the ANOVA test. In order to understand where the differences lay, the Tukey Post-Hoc test was also carried out. There were significant differences between the values of the religious houses in the North and the South as well as the South and the Midlands. However, there was statistically no difference between the values of the religious houses in the Midlands and the North. This suggests that there was a greater difference in the income and potential purchasing power between the religious houses in the south of English and those located in either the north or the midlands.

Due to sampling restrictions, it was not possible to divide the sample eight houses into north, midlands, and south. However, of the eight houses included in this study, two fall within the

Midlands region, Hulton Abbey and Elstow Abbey. The dissolution value of Elstow Abbey (£331) more closely relates to the average Southern value (£220) than the Midlands (£127), suggesting that may have had more in common, in terms of income, with the other southern houses. However, Hulton Abbey had a dissolution value (£87) that more closely relates to the Northern Houses (£119) and, given that it is the most northern of the southern houses in this research, may represent somewhat of an anomaly.

The original site intended for use in this research that Hulton Abbey replaced was situated outside London, placing it firmly in the Southern region. The Abbey of Stratford Langthorne had a gross valuation of £573, which would have made it the wealthiest religious house in this study. The other two southern sites, The Priory of St James, which had a valuation of only £35 at Dissolution, and Nunnaminster, with a valuation of £178, make the spread of the Dissolution value of the Southern sites fairly even. Therefore, although not ideal, Hulton Abbey has continued to be included as a Southern site due to it representing a middle-income southern house, although this is not ideal.

Table 4.23 Average Pensions and Dissolution Valuation for Northern and Southern Houses

	Abbess/Abbot	Prioress/Prior	Approx. pension	Total gross value at dissolution
North	none recorded	6.67	3.85	61.00
South	32.00	7.33	3.90	157.75

In comparing the pensions of the houses included in this study, the average pension of the prior or prioress is only slightly higher for priors (Table 4.23). The average pension of the average monks and nuns, however, is identical even though the average gross value of the houses is so different.

There were seven apostate monks and nuns recorded from the four northern houses and four from the southern.

4.3.4 Summary of Results

The southern population was found to have significant higher prevalence rates of dental calculus, while the northern population was found to have higher prevalence rates of dental caries, maxillary sinusitis, non-specific infection, and trauma. Both the dress accessories and horse paraphernalia artefact classes were found in significantly higher proportion in the southern artefact assemblage, while the north had high proportions of the following classes: hygiene, money, religious paraphernalia, tools/industrial equipment, and writing/reading artefact. Southern houses were found to have had significantly higher Dissolution values, but fewer apostates.

4.4 Urban and Rural Houses

As in the modern world, the lives of people living in cities would have been vastly different to those living in the country in medieval England (Dyer, 1989). In addition to the impact that socio-

cultural beliefs about the needs of men and women, would have had, as well as potential environmental differences, the urban rural divide is one of the ways in which the lives of the inhabitants of religious houses could have been significantly different. The following section will outline the results of the chi-squared tests performed on the combined artefact assemblages and skeletal populations from the eight religious houses in this study.

Table 4.24 Results for Statistical Comparison of Urban and Rural Houses

Significant	X^2	p	Higher Rate
Dress Accessories	19.94	7.99E-06	Rural
Gaming	4.01	0.05	Urban
Horse	12.38	4.33E-04	Rural
Household	7.59	0.01	Rural
Hygiene	38.41	5.73E-10	Urban
Jewellery	4.37	0.04	Urban
Religious	22.03	2.69E-06	Urban
Tools/Industrial	3.79	0.05	Urban
Weapons	3.79	0.05	Urban
Writing/Reading	5.10	0.02	Urban
Calculus Elements-wise Prevalence	2348.39	0.00E00	Rural
Calculus Corrected Prevalence	190.52	2.45E-43	Rural
Caries Elements-wise Prevalence	144.95	2.20E-33	Rural
Caries Corrected Prevalence	43.30	4.71E-11	Rural
Maxillary Sinusitis Corrected Prevalence	11.49	7.01E-04	Rural
Non-Specific Infection Corrected Prevalence	10.91	9.54E-04	Rural
Osteoarthritis Elements-wise Prevalence	100.93	9.55E-24	Rural

Table 4.24 shows the results of the chi-squared tests. There were ten artefact classes that were found to exist in significantly different proportions in the artefact assemblages of urban and rural houses. Five of the eight health indicators were also found to have significantly different prevalence rates in the two skeletal populations. Although a comparison of the Dissolution valuations of the houses recorded in the *Monasticon* was not possible for the urban and rural houses, there were differences in the pensions and valuations of the houses in this study. First, however, the differences in the artefact assemblages and health indicators will be discussed in more detail.

4.4.1 Health Indicators

The demographic profile of the skeletal populations from the urban and rural houses can be found in Figures 4.21 and 4.22. It is clear the there are far more individuals at the urban sites but, for both populations, the Older (45+) age category is the largest (77 or 23.1% rural, 211 or 42.2% urban), when the Adult category is excluded. The Young Adult (17-25) age category is also the smallest adult age category for both (28 or 8.4% rural, 75 or 15.0% urban). The two groups differ in that the urban houses have slightly more individuals in the 35-45 age category than the 25-35 group (195 or 58.6% vs. 180 or 36.0%), while for the rural sites it is opposite (33 or 10.0% vs. 34 or 6.8%).

The urban sites had more males than females (1.85:1) identified, while for the rural population it was almost equal (1.04:1). This could be a reflection of the make up of the two groups, the urban group being made up of three monasteries and two nunneries, while the rural group was made up of two nunneries and one monastery. This is the result of the fact that there were no Northern rural monasteries with available skeletal populations to include in this study (see section 3.2).

As with the Northern and Southern populations, the males outnumber the females in most age categories (Tables 4.21 and 4.22). Only in the 17-25 and 25-35 age categories in the rural population do the females outnumber the males. This is not unexpected, as there were more individuals overall from the monasteries than the nunneries.

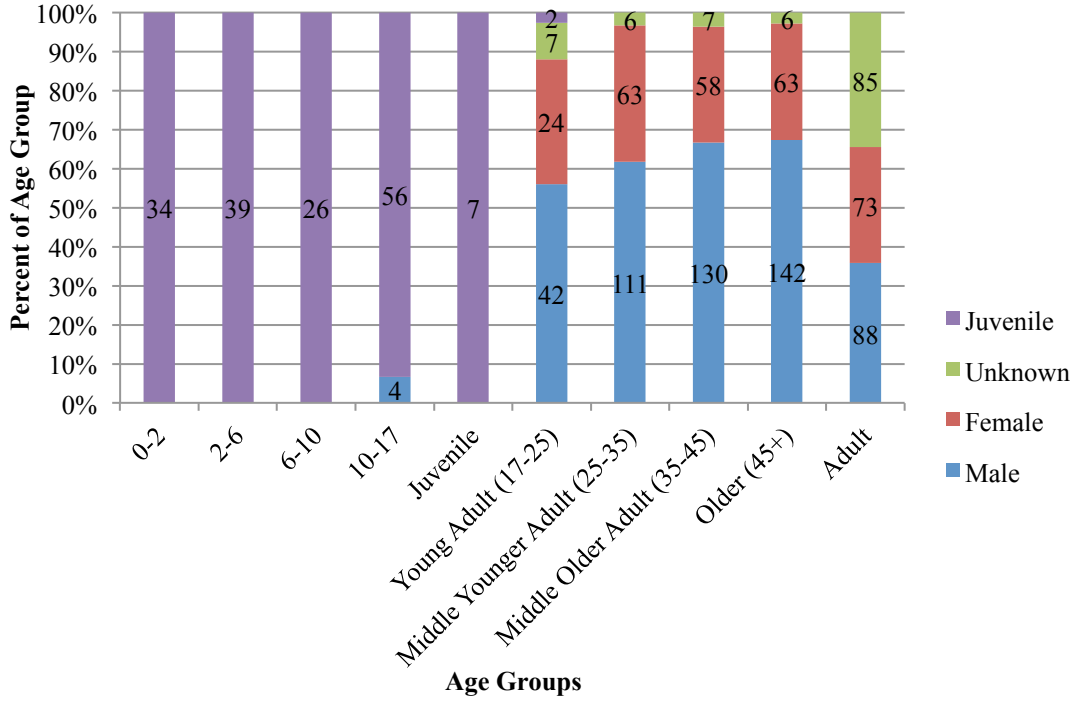


Figure 4.21: Demography for the Urban Houses

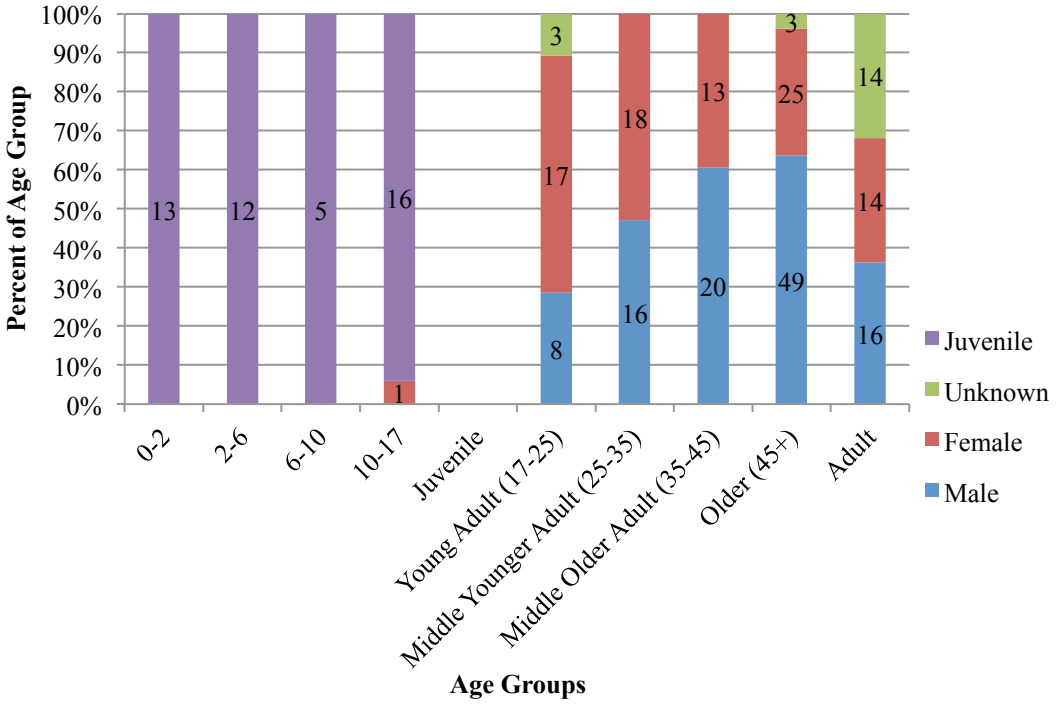


Figure 4.22: Demography for the Rural Houses

As mentioned above, there were five health indicators that had statistically significant different prevalence rates between the urban and rural sites; Calculus, Dental Caries, Maxillary Sinusitis, Non-Specific Infection and Osteoarthritis. For all of these indicators, the rural sites had higher prevalence rates.

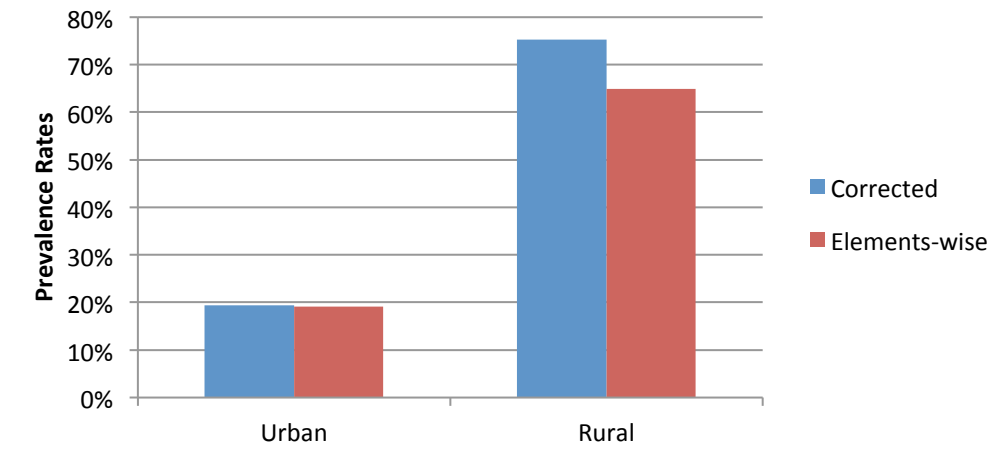


Figure 4.23: Dental Calculus Prevalence Rates for Urban and Rural Houses

For both dental calculus (Figure 4.23) and dental caries (Figure 4.24), both the differences in corrected and element-wise prevalence rates were found to be statistically significant.

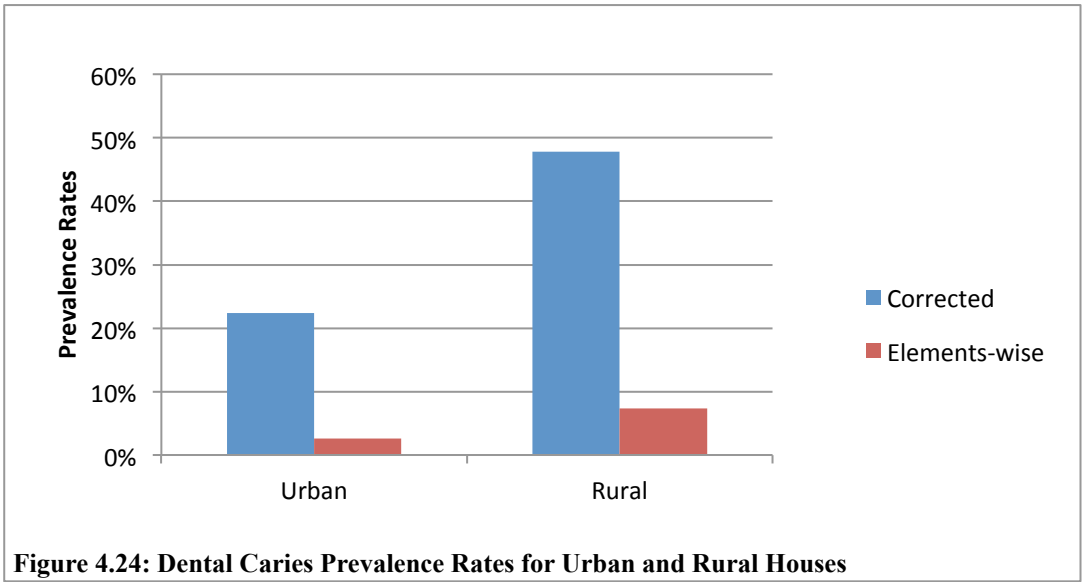


Figure 4.24: Dental Caries Prevalence Rates for Urban and Rural Houses

Due to problems with standardisation of recording pathological conditions, it was not possible to compare element-wise prevalence rates for maxillary sinusitis. However, the corrected prevalence rates were found to be significantly different between the urban and rural sites (Figure 4.25).

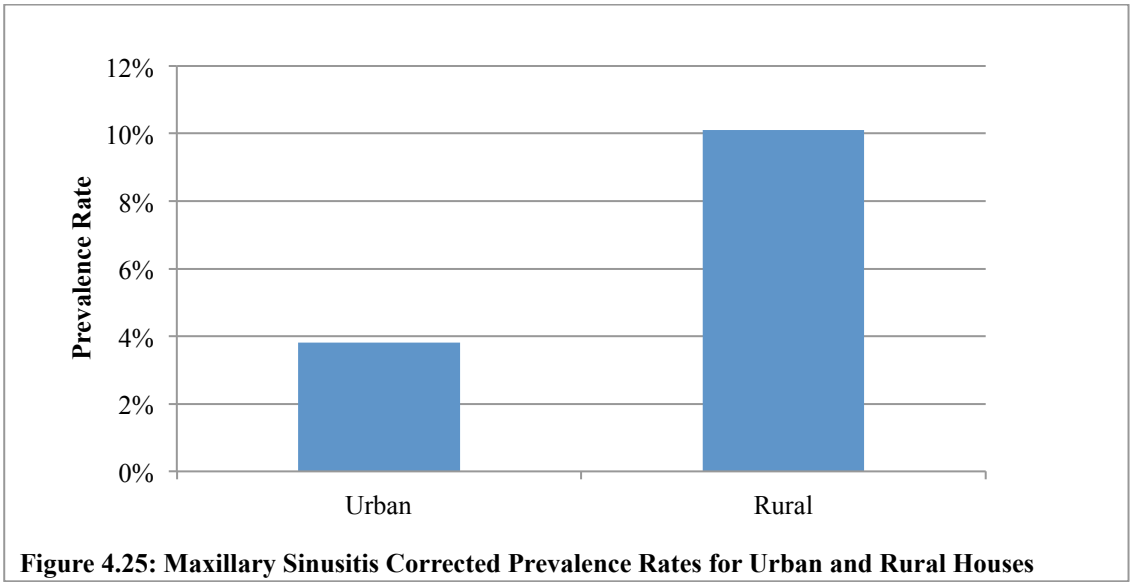


Figure 4.25: Maxillary Sinusitis Corrected Prevalence Rates for Urban and Rural Houses

The corrected prevalence rates for non-specific infection were found to be significantly different between the urban and rural sites, but the element-wise prevalence rates were not ($X^2 = 0.97$, $p=0.32$) (Figure 4.26).

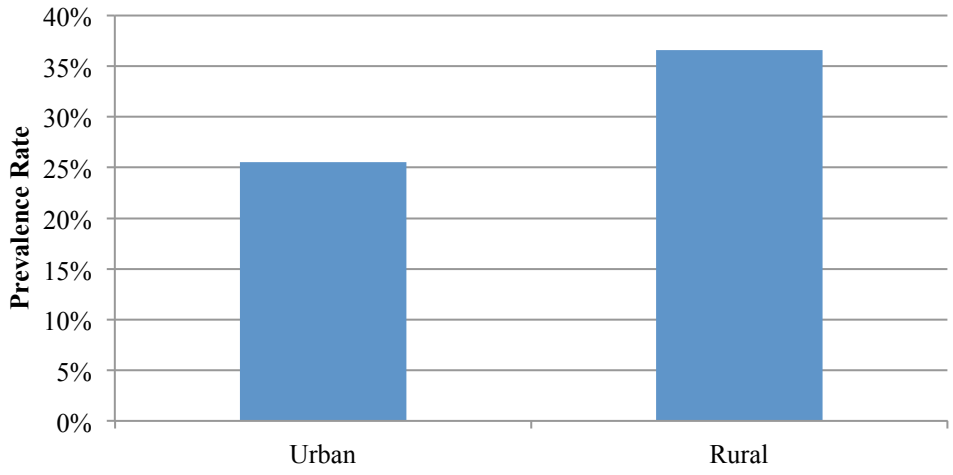


Figure 4.26: Non-Specific Infection Corrected Prevalence Rates for Urban and Rural Houses

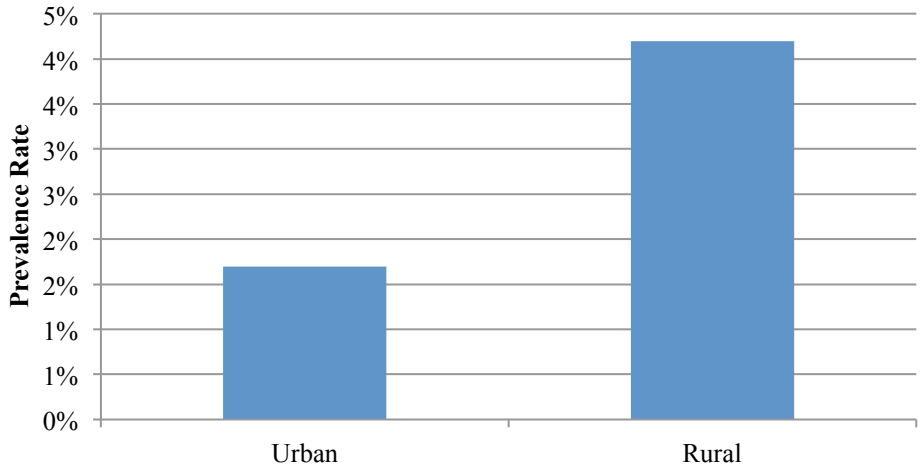


Figure 4.27: Osteoarthritis Elements-wise Prevalence Rates for Urban and Rural Houses

Similarly, only the element-wise prevalence rates for osteoarthritis were found to be significantly different between the urban and rural populations (Figure 4.27). In addition to the overall element-wise prevalence rate, all the joints analysed were found to be have been affected in significantly different proportions in the urban and rural populations (Table 4.25). For every joint, the rural population had higher prevalence rates of osteoarthritis (Figure 4.28).

Table 4.25 Elements-wise Prevalence Rates of Osteoarthritis by Joint for Urban and Rural Houses

	X^2	p
TMJ	7.25	0.01
Spine	*98.19	3.80E-23
Shoulders	*125.44	4.08E-29
Elbows	*35.76	2.23E-09
Wrists	25.07	5.53E-07
Sacroilliac	8.52	3.51E-03
Hips	*247.94	7.29E-56
Knees	*94.43	2.54E-22
Ankles	20.40	6.27E-06

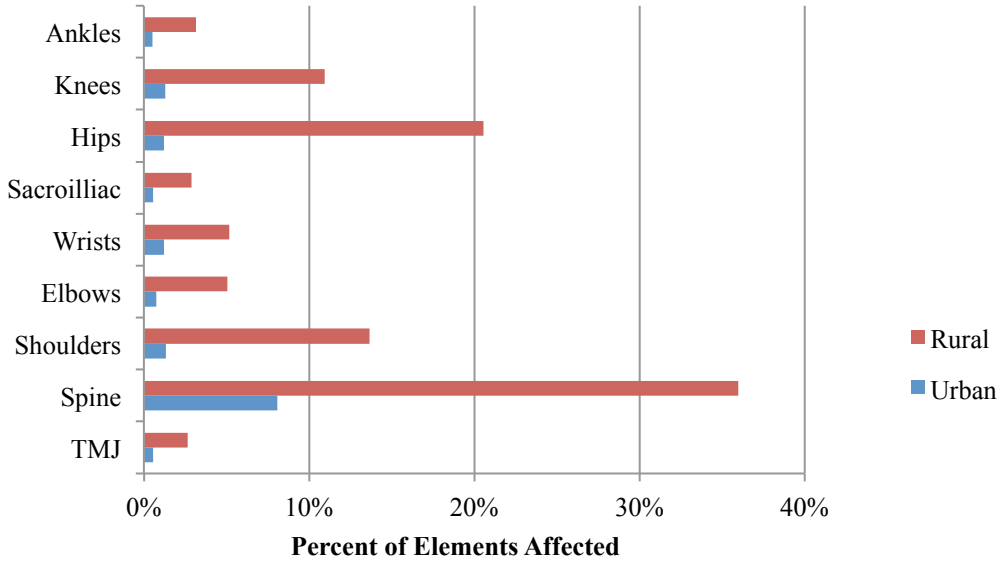


Figure 4.28: Elements-wise Prevalence Rates of Osteoarthritis by Joint for Urban and Rural Houses

4.4.2 Artefact Assemblages

The breakdown of the artefact assemblages can be found in Table 4.26 and Figures 4.29 and 4.30. Of the ten artefact classes that were found in significantly different proportions, three were found in higher proportions at the rural sites and the other seven comprised a higher proportion at the urban sites. The Dress Accessories, Horse and Household classes were found in a higher proportion at the rural sites. Gaming, Hygiene, Jewellery, Religious, Tools/Industrial, Weapons and Writing/Reading were the artefact classes found in a higher proportion at the urban sites.

Table 4.26 Number of Artefacts in the Artefact Classes for Urban and Rural Houses

	Urban	Rural
Dress Accessories	420	592
Gaming	9	3
Horse	2	20
Household	152	229
Hygiene	50	8
Jewellery	34	21
Money	57	49
Music	4	3
Religious	51	18
Textile	23	22
Timekeeping	0	1
Tools/industrial	31	11
Weapons	4	3
Writing/reading	20	10
Total	**857**	**990**

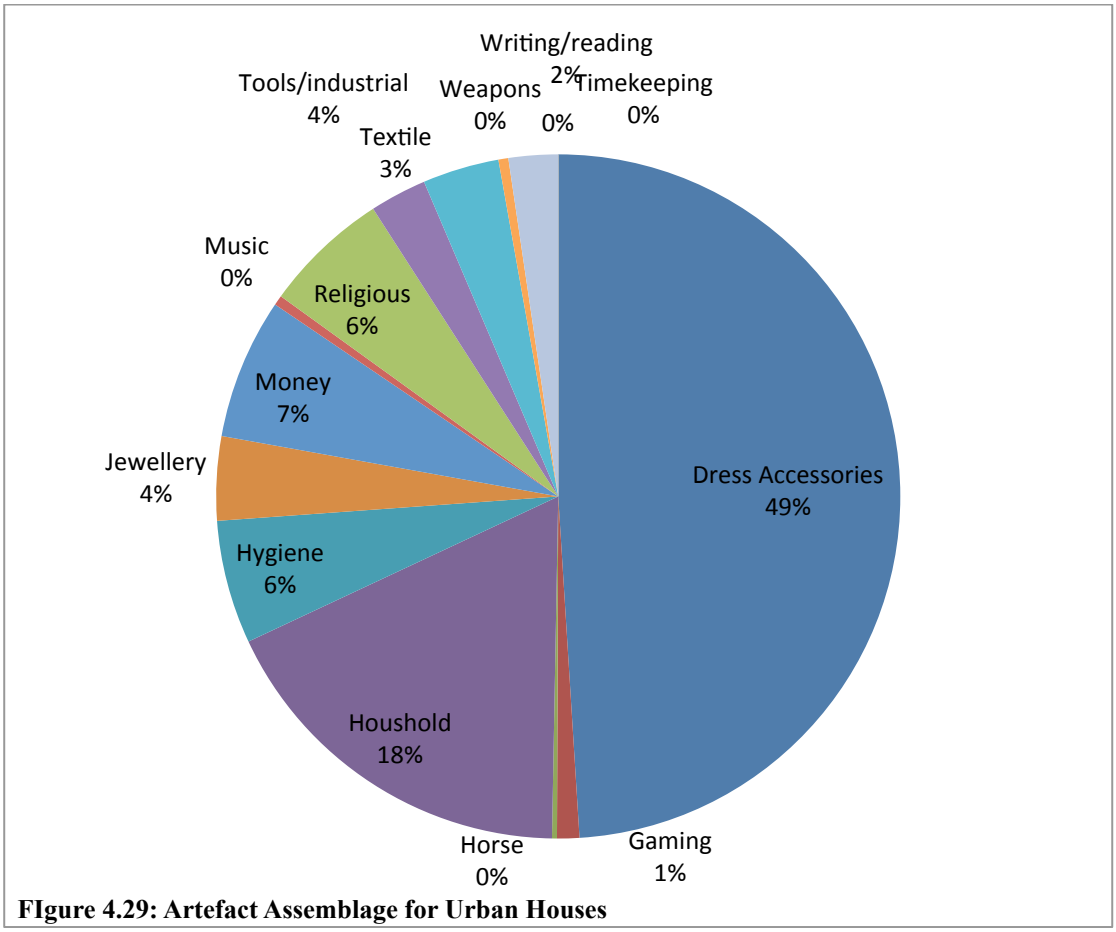


FIgure 4.29: Artefact Assemblage for Urban Houses

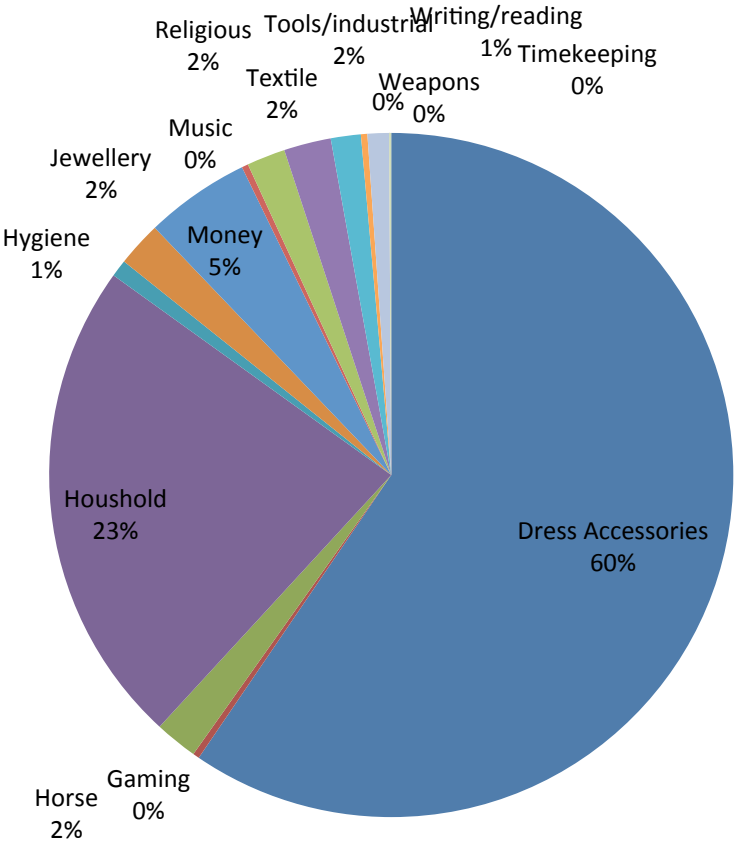


Figure 4.30: Artefact Assemblage for Rural Houses

Rosary beads dominate the high status artefacts associated with the urban sites in this collection, and the high status artefacts associated with the rural houses are more of a mix, primarily of jewellery and religious items (Table 4.27).

Table 4.27: High Status Artefacts for Urban and Rural Houses

Urban	Rural
Swords (3)	Gold and silver finger rings
Zoomorphic vessel lid	Gold pendant
Jet bead	Gold brooch
Glass bead	Glass button
Amber bead	Silver thimble
Jet crucifix	Religious badges
Toothbrushes	Beeswax chalice
Blue glass bead	Jet crucifix
Amethyst bead	
Tortoise shell comb	

4.4.3 Dissolution Valuation and Pensions

Unlike the previous two sections and the following one, it was not possible to carry out an ANOVA test on the Dissolution values as recorded in the *Monasticon Anglicanum* for urban and rural houses. This is because this information was not recorded in that volume. The financial information for the houses included in this study, however, can be found in Table 4.28. It shows that, on average, the rural houses had a higher gross valuation at Dissolution than the urban houses

and that they paid a higher pension to the abbess or abbot and the average monk or nun.

However, the prior or prioress had a higher average pension from the urban houses. This could be a result of the fact that, of the three houses in the rural category, only two have the pensions for the prioress or prior recorded and both of these were nunneries, where the average pension for the prioress was lower than the average prior. In addition to this fact, the only urban house with a recorded pension for an abbot or abbess is Nunnaminster.

Table 4.28 Average Pensions and Dissolution Values for the Urban and Rural Houses

	Abbess/Abbot	Prioress/Prior	Approx. pension	Total gross value at dissolution
Urban	26.00	8.50	3.67	82.00
Rural	35.00	4.00	4.31	162.00

Of the eleven apostates recorded from these eight houses, six were associated with urban houses and five with rural.

4.4.4 Summary of Results

Rural houses had significantly higher prevalence rates of dental calculus, dental caries, maxillary sinusitis, non-specific infection, and osteoarthritis. Rural houses also had higher proportions of the dress accessories, horse paraphernalia, and household artefact classes. The urban artefact assemblage had higher proportions of artefacts associated with gaming, hygiene, jewellery, religious paraphernalia, tools/industrial equipment, weapons, and writing/reading. No significant difference was found between the Dissolution values from the urban and rural houses, although the urban houses had slightly more recorded apostates.

4.5 Older and Reform Orders

The details of the results of the chi-squared tests used to compare the artefact assemblages and skeletal health indicators from the older and reform order sites are listed below in Table 4.29. Out of a possible thirteen artefact classes, seven were found to be represented in significantly different proportions between the two types of site. Likewise, five of the eight health indicators were found to have significantly different prevalence rates within the two groups. An analysis of the Dissolution values also showed a significant difference between older and reform orders.

Table 4.29 Results for Statistical Comparison for Older and Reform Orders

Significant	X^2	p	Higher Rate
Dress Accessories	9.58	1.97E-03	Older
Horse	5.72	0.02	Older
Household	12.19	4.80E-04	Older
Hygiene	39.16	3.91E-10	Reform
Religious	22.01	2.71E-06	Reform
Tools/Industrial	27.13	1.91E-07	Reform
Writing/Reading	15.86	6.82E-05	Reform
Calculus Elements-wise Prevalence	161.81	4.55E-37	Older
DISH Elements-wise Prevalence	8.95	2.78E-03	Older
Maxillary Sinusitis Corrected Prevalence	18.50	1.70E-05	Reform
Non-Specific Infection Elements-wise Prevalence	149.23	2.55E-34	Reform
Non-Specific Infection Corrected Prevalence	67.52	2.09E-16	Reform
Trauma Elements-wise Prevalence	7.17	0.01	Reform
Trauma Corrected Prevalence	9.22	2.40E-03	Reform
Dissolution Gross Valuation from all houses recorded in the Monas. Angli.*	F(3,447)=6.52	p<0.00	Older

***compared using ANOVA not chi squared**

4.5.1 Health Indicators

The demographic profiles for the Older and Reform orders can be found in Figures 4.31 and 4.32. There were far more individuals found at the Reform sites and the two groups have a very different age distribution. The largest age category represented at the Reform sites is the Older (45+) group (219 or 34.5%), followed by the 35-45 (164 or 25.8%), then the 25-35 (139 or 21.9%) and lastly by the 17-25 age group (53 or 8.4%). In fact, the 17-25 age category is actually outnumbered by the 10-17 year age group (60 or 9.5%). The Older order population, however, has the 25-35 age category (75 or 27.2%) as the largest, followed closely by the 45+ (69 or 25.0%) and 35-45 (65 or 23.6%) groups. Like the Reform group, the 17-25 age category is the smallest of the adult age groups (50 or 18.1%), but unlike the Reform orders it far outstrips the 10-17 group (17 or 6.2%).

The distribution of the sexes is also different, with the Older orders being almost equal between the males and females (1.08:1) and the Reform orders being closer to two to one (2.03:1). As the Reform orders group is made up of three monasteries and one nunnery and the Older orders group is the opposite, this is not particularly surprising.

Although having an almost one to one ratio, the females from the Older orders outnumber the males in almost every age group, with the exception of the Older (45+) category. Within the Reform orders, the males outnumber the females in every age group (Table 4.13.5).

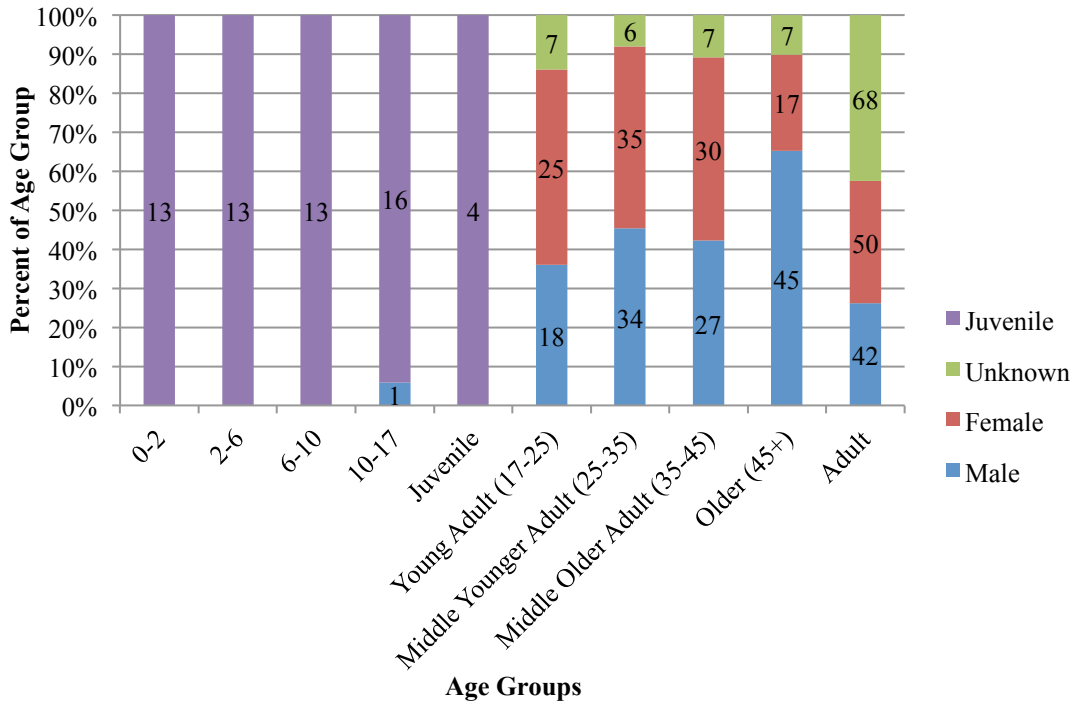


Figure 4.31: Demography for the Older Orders

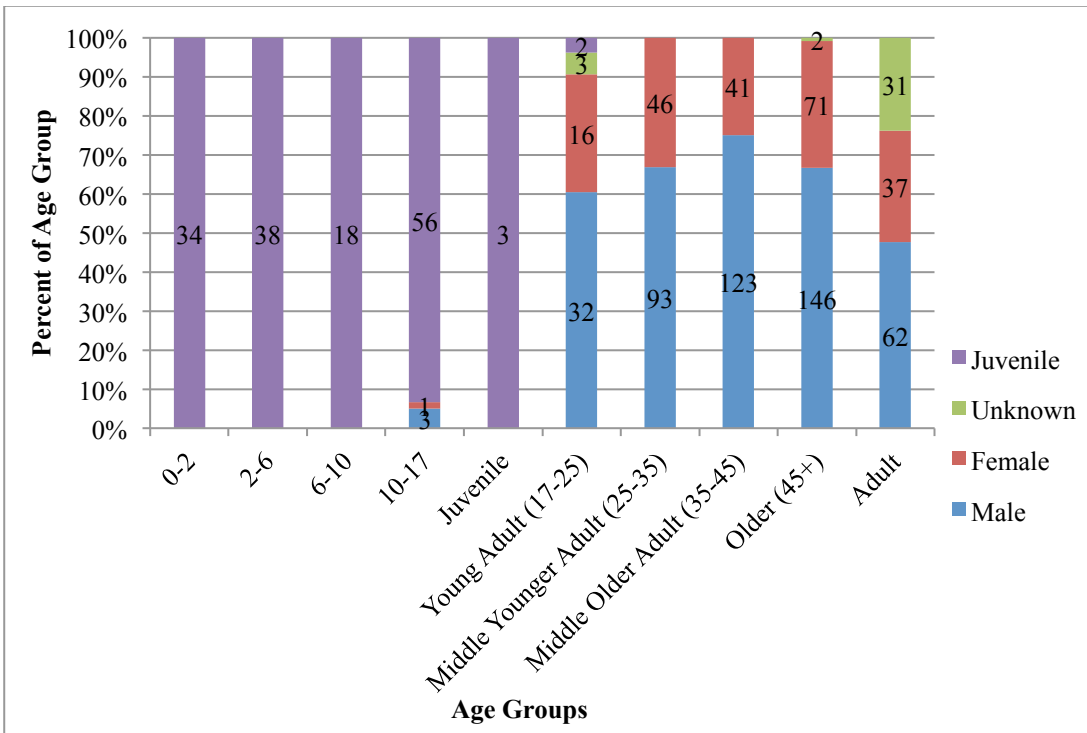


Figure 4.32: Demography for the Reform Orders

The health indicators that were found to exist in significantly different prevalence rates between the two populations were the element-wise rates of dental calculus (Figure 4.33) and DISH (Figure 4.34), the corrected rate of maxillary sinusitis (Figure 4.35), and both the corrected and element-wise rates of non-specific infection (Figure 4.36) and trauma (Figure 4.37).

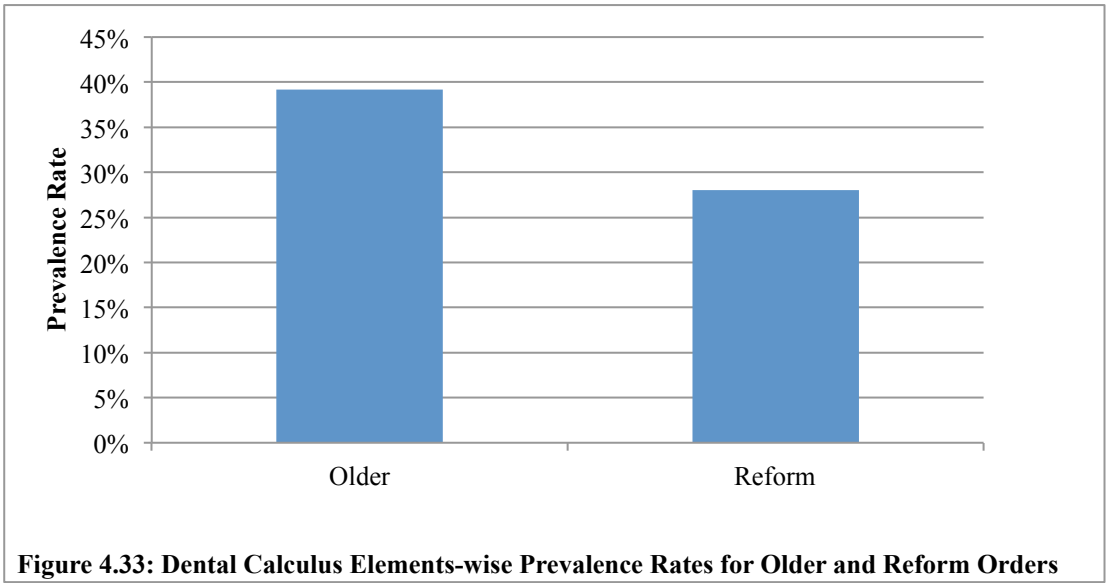


Figure 4.33: Dental Calculus Elements-wise Prevalence Rates for Older and Reform Orders

The element-wise prevalence rate for dental calculus was higher among the individuals from the Older order sites than the Reform order sites. The same pattern is seen in the element-wise prevalence rates for DISH. The other three health indicators with significantly different rates are all found at a higher prevalence among the population from the Reform order sites.

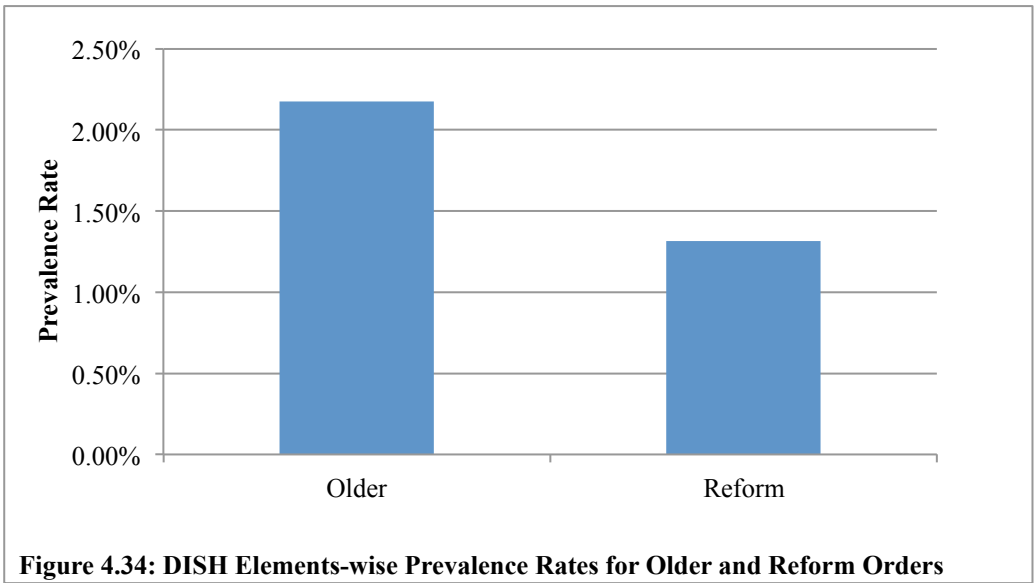


Figure 4.34: DISH Elements-wise Prevalence Rates for Older and Reform Orders

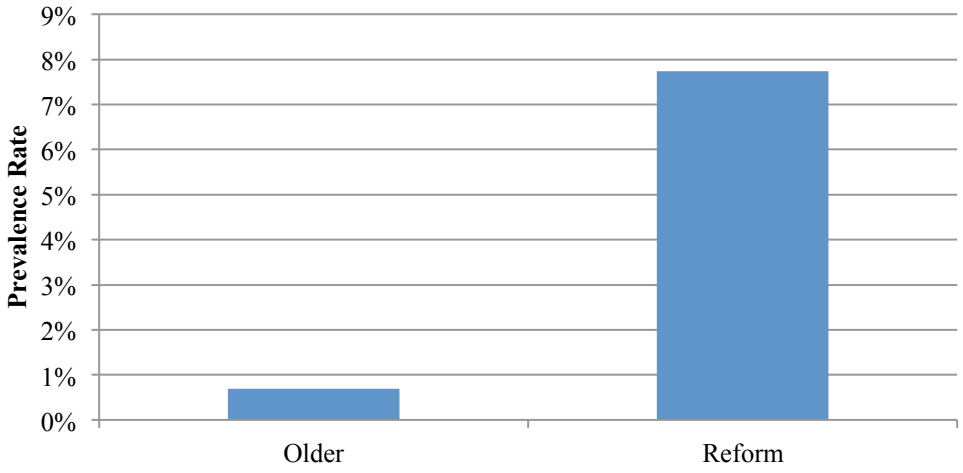
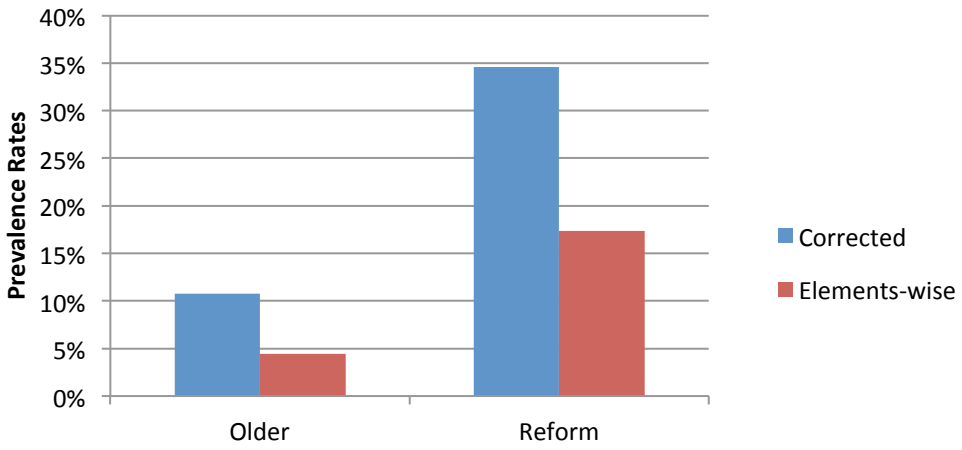


Figure 4.35: Maxillary Sinusitis Corrected Prevalence Rates for Older and Reform Orders

The corrected prevalence rate for maxillary sinusitis is higher among the population from the Reform orders. Both the corrected and element-wise prevalence rates for non-specific infection were found to be significantly higher from the Reform orders.



4.36: Non-Specific Infection Prevalence Rates for Older and Reform Orders

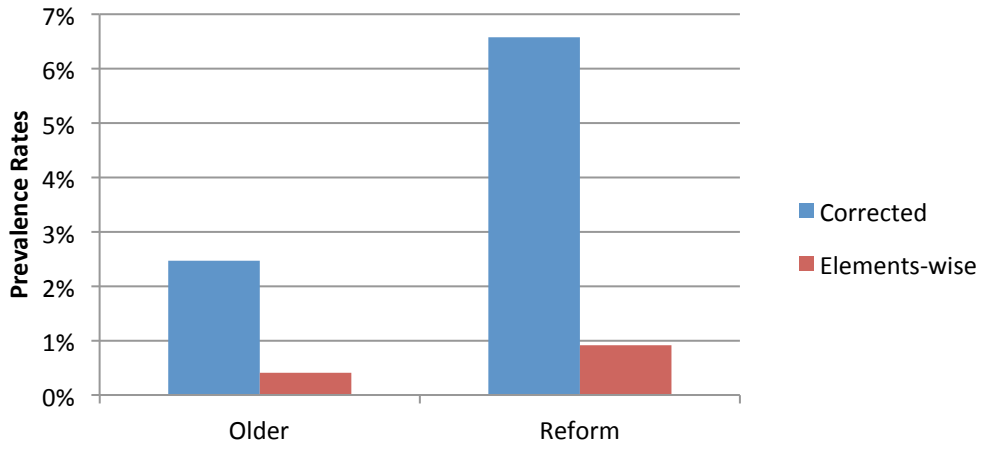


Figure 4.37: Trauma Prevalence Rates for Older and Reform Orders

As with non-specific infection, both the corrected and element-wise prevalence rates for trauma were found to be higher in the Reform order population.

Although the overall corrected and element-wise prevalence rates for osteoarthritis were not found to be significantly different between the two groups, two specific joints were found to have significantly different element-wise rates (Table 4.30). Both the spine and the hips were found to have significantly higher rates of osteoarthritis. The hips were found to have a higher prevalence of osteoarthritis in the Reform population, and the spine was more affected in the Older population (Figure 4.38).

Table 4.30 Chi-Squared values for Osteoarthritis Prevalence Rates by Joint for Older and Reform Orders

	TMJ	Spine	Shoulders	Elbows	Wrists	Sacroilliac	Hips	Knees	Ankles
p=	0.36	2.97E-11	0.71	0.43	0.25	0.47	2.89E-05	0.07	0.08
X^2=	0.84	44.20*	0.13	0.63	1.30	0.51	17.49	3.25	2.97

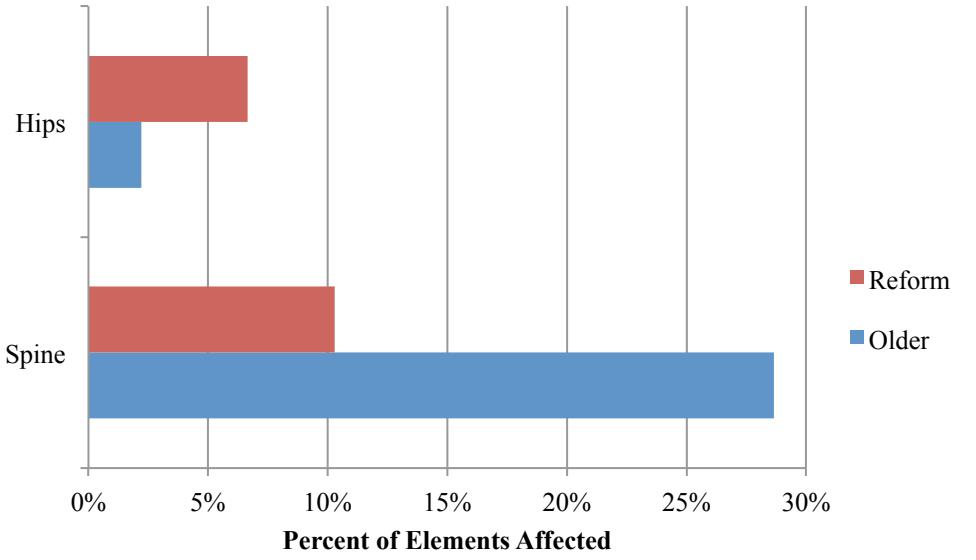


Figure 4.38: Elements-wise Prevalence Rates of Osteoarthritis by Joint for Older and Reform Orders

4.5.2 Artefact Assemblages

A breakdown of the artefact assemblages for the Older and Reform Orders can be found in Table 4.31 and Figures 4.39 and 4.40. Of the seven artefact classes that existed in significantly different proportions, three were found in higher proportions at the Older Order sites and four at the Reform Order sites. The artefact classes found in higher proportions at the Older Order sites were the Dress Accessories, Horse and Household. The Reform Order sites had higher proportions in the Hygiene, Religious, Tools/Industrial and Writing/Reading classes.

Table 4.31 Number of Artefacts in the Artefact Classes for the Older and Reform Orders

	Reform Orders	**Older Orders**
Dress Accessories	357	655
Gaming	6	6
Horse	3	19
Household	117	264
Hygiene	45	13
Jewellery	18	37
Money	36	70
Music	4	3
Religious	45	24
Textile	17	28
Timekeeping	1	0
Tools/industrial	31	11
Weapons	4	3
Writing/reading	22	8
Total	**706**	**1141**

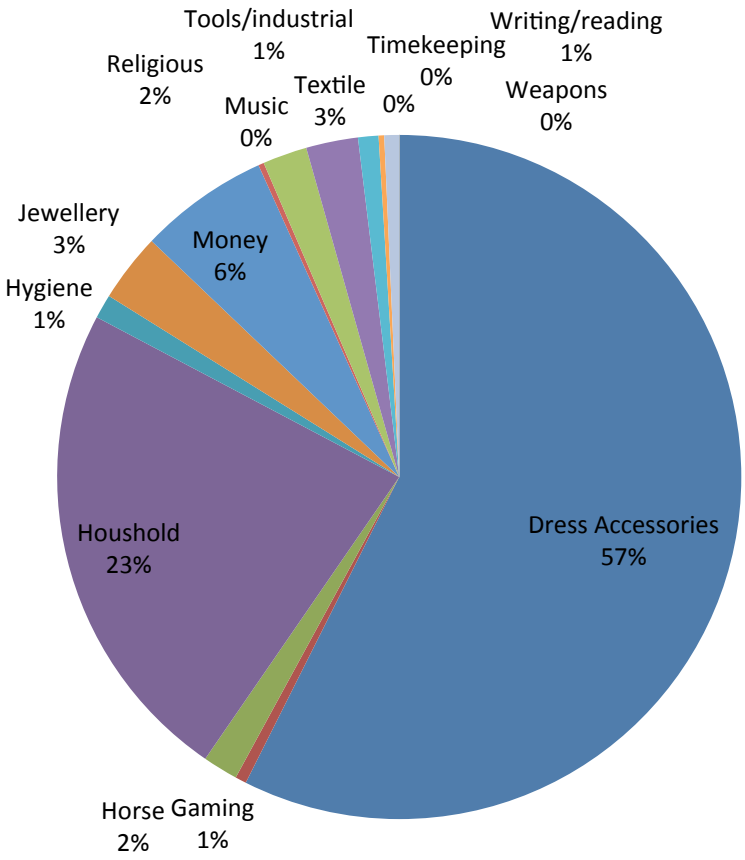


Figure 4.39: Artefact Assemblage for the Older Orders

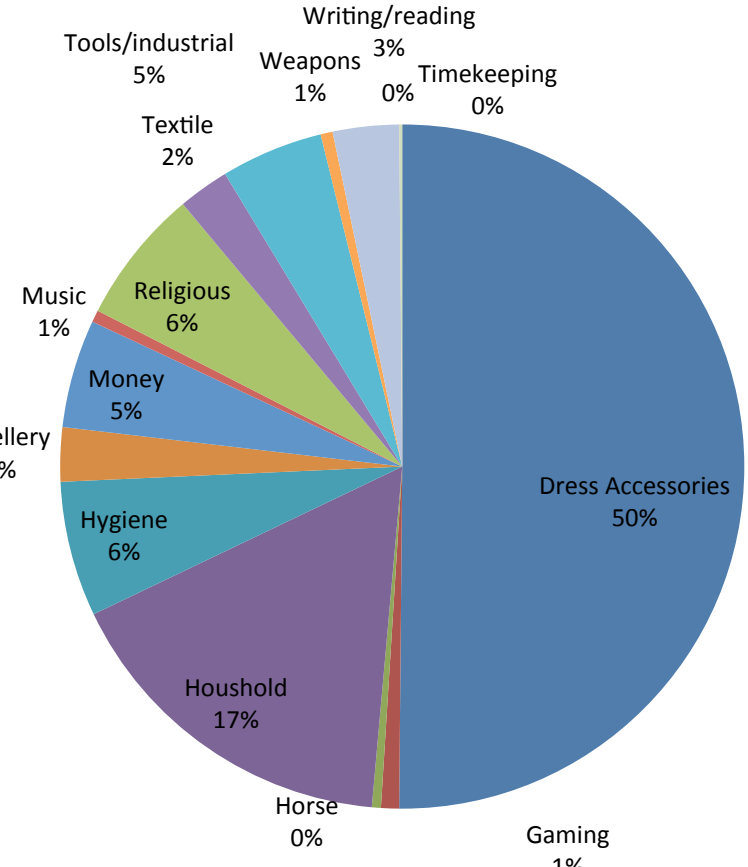


Figure 4.40: Artefact Assemblage for the Reform Orders

As with the overall artefact assemblages for the older and reform orders, the high status artefacts are identical to those of nunneries and monasteries (Table 4.32). The older order high status artefacts, therefore, are primarily associated with personal adornment, while religious items dominate the reform order high status artefacts.

Table 4.32: High Status Artefacts for Older and Reform Orders

Older	Reform
Zoomorphic vessel lid	Swords (3)
Gold and silver finger rings	Jet bead
Gold pendant	Glass bead
Gold brooch	Amber beads
Glass button	Jet crucifix
Silver thimble	Toothbrushes
Jet bead	Religious badges
Blue glass bead	Beeswax chalice
Amethyst bead	
Tortoise shell comb	

4.5.3 Dissolution Valuation and Pensions

The difference between the average Dissolution gross valuation of the different kinds of orders, as recorded in the *Monasticon Anglicanum*, was found to be statistically significant. When the Tukey Post-Hoc test was carried out (Table 4.33), it was found that the difference between the older orders and the reform orders was significant, as was the difference between the older orders and the hospitals. The older orders had the highest average gross value at Dissolution (£206), with the reform orders having the second highest average (£123), followed by the colleges (£100), with the hospitals having the lowest (£74).

Table 4.33 Results of the Tukey Post-Hoc Test Comparing Older and Reform Orders

F(3,447)=6.52	**p<0.00**
Older:Reform	p=0.01
Older:Colleges	p=0.08
Older:Hospitals	p=0.01
Reform:Colleges	p=0.96
Reform:Hospitals	p=0.69

The houses included in this study follow the above pattern, with the average valuation being higher at the older order houses (Table 4.34). The average pension granted to an abbot or abbess was also higher at the houses belonging to an older order. However, the average pension granted to a prior or prioress was identical, and the average pension for a monk or nun was actually higher at the reform order houses.

Table 4.34 Average Pensions and Dissolution Values for Older and Reform Orders

	Abbess/Abbots	Prioress/Prior	Approx. pension	Total gross value at dissolution
Older	38.00	7.00	3.45	153.00
Reform	20.00	7.00	4.75	67.33

Of the eleven individuals recorded as apostates, six were associated with reform houses and five

with the older orders.

4.5.4 Summary of Results

The older orders cemetery population had higher prevalence rates of dental calculus and DISH. The reform orders had higher prevalence rates of maxillary sinusitis, non-specific infection, and trauma. The older orders artefact assemblage had high proportions of dress accessories, horse paraphernalia, and household artefact classes. The reform orders had higher proportions of the following artefact classes: hygiene, religious paraphernalia, tools/industrial equipment, and writing/reading. The houses belonging to the older orders were found to have significantly higher Dissolution values, but fewer apostates.

4.6 Complete Summary of Results

The following section will briefly summarise the results of the statistical tests discussed in detail above.

Monasteries and Nunneries

- Health Indicators
    - Both the corrected and element-wise prevalence rates of dental calculus, dental caries, and osteoarthritis were found to be significantly higher in the nunneries cemetery population.
    - The corrected prevalence rate of maxillary sinusitis was found to be significantly higher in the nunneries cemetery population.
- Artefact Assemblages
    - There were significantly more artefacts in the dress accessories, horse paraphernalia, household, religious paraphernalia, tools/industrial equipment, and the writing/reading artefact classes found at monasteries.
- Documents
    - Monasteries were found to have had significantly higher Dissolution values.

North and South

- Health Indicators
    - The element-wise prevalence rate of dental calculus was found to be significantly higher in the southern cemetery population.
    - The element-wise prevalence rate of dental caries was found to be significantly higher in the northern cemetery population.
    - The corrected prevalence rate of maxillary sinusitis was found to be significantly higher in the northern cemetery population.
    - Both the corrected and element-wise prevalence rates of non-specific infection and trauma were found to be significantly higher in the northern cemetery population.
- Artefact Assemblages
    - There were significantly more artefacts in the dress accessories and horse paraphernalia artefact classes found at southern houses.
    - There were significantly more artefacts in the hygiene, money, religious paraphernalia, tools/industrial equipment, and writing/reading artefact classes found at northern houses.
- Documents
    - The southern houses were found to have had significantly higher Dissolution values.

Urban and Rural

- Health Indicators
    - Both the corrected and element-wise prevalence rates of dental calculus and caries were found to be significantly higher in the cemetery population of rural houses.
    - The corrected prevalence rates of both maxillary sinusitis and non-specific infection were found to be significantly higher in the cemetery population of rural houses.
    - The element-wise prevalence rate of osteoarthritis was found to be significantly higher in the cemetery population of rural houses.
- Artefact Assemblages
    - There were significantly more artefacts in the dress accessories, horse paraphernalia, and household artefact classes at rural houses.
    - There were significantly more artefacts in the gaming, hygiene, jewellery, religious paraphernalia, tools/industrial equipment, weapons, and writing/reading artefact classes at urban houses
- Documents
    - There was no significant difference in the Dissolution values between the urban and rural houses.

Older and Reform Orders

- Health Indicators
    - The element-wise prevalence rates of both dental calculus and DISH were significantly higher in the cemetery population of houses belonging to the older orders.
    - The corrected prevalence rate of maxillary sinusitis was significantly higher in the cemetery population of houses belonging to the reform orders.
    - Both the corrected and element-wise prevalence rates of non-specific infection and trauma were significantly higher in the cemetery population of houses belonging to the reform orders.
- Artefact Assemblages
    - There were significantly more artefacts in the dress accessories, horse paraphernalia, and household artefact classes at the houses belonging to the older orders.
    - There were significantly more artefacts in the hygiene, religious paraphernalia, tools/industrial equipment, and writing/reading artefact classes at the houses belonging to the reform orders.
- Documents
    - The houses belonging to the older orders were found to have significantly higher Dissolution values.

The following chapter will discuss the implications of the differences found between the different types of sites; monasteries and nunneries, northern and southern houses, urban and rural houses, and houses belonging to older and reform orders. The effects that these differences could have had on the quality of life of the inhabitants of religious houses in medieval England will be discussed as will the type of house most likely to confer the highest quality of life, both for the physical body as well as the spiritual body.

Chapter 5: Discussion

The aims of this research were:

- To consider the validity or suitability of the phrase "quality of life" (QoL) when studying the lives of archaeological populations
- To explore the differences, if any, between the quality of life of the inhabitants of different monastic groups according to gender (nunneries and monasteries).
- To detect any inequality in the QoL between northern and southern houses, urban and rural sites and between orders (older and reform orders).

A cross-disciplinary approach was used; bioarchaeological and archaeological data, as well as evidence from some documentary sources, were utilised to gain the most complete picture possible. This was important as the term "quality of life" encompasses not only a person's physical well being, but also their place in society and their relationship to the culture in which they live (Fayers and Machin, 2000, p. 3; Bowling, 1997, p. 5; Committee of the Regions, 1995; Szalai, 1980). Quality of life studies in living populations, of course, often include an individual's personal views from questionnaires (Fayer and Machin, 2000) but, as this was not a research tool that could be used for this study, the importance of including as many types of data cannot be overstated. Quality of life, in terms of this research, is used to describe both the physical and spiritual elements of the lives of the inhabitants of these monastic sites. A good physical quality of life is defined as a combination of factors, including health living conditions, a well balanced diet, access to socio-cultural norms and activities (i.e. reading, writing, and a certain level of personal comfort), and a level of financial security. Spiritual quality of life, on the other hand, is defined as a combination of a certain lack of physical comfort to conform to the medieval ideal and the evidence of conformity to those tasks laid out in the various monastic rules, including that of Benedict (i.e. prayer, scholarship, and physical toil).

Eight archaeological sites were identified that had sufficiently large datasets from associated skeletal samples. Ensuring an equal number of excavated nunneries and monasteries was of primary importance, meaning that four of each were identified for study. For the other three characteristics, (i.e. region, urbanism and ideology) being examined, this meant that the nunneries and monasteries had to conform to roughly equal numbers for each of these groups. Once the sites were identified, the original small finds data had to be collected and put into a database, as did the data from the original skeletal analyses. The artefacts were grouped into different artefact classes, and the proportions for each class in relation to the assemblage as a whole was compared using the chi-squared test. Similarly, the prevalence rates of eight previously identified health indicators were also compared using the chi-squared test. Finally, the average Dissolution value of all monasteries and nunneries, as collected from the *Monasticon Anglicanum*, was compared using the ANOVA test.

5.1 Limitations of the data

Before moving into the full discussion of the results of the analysis of the skeletal, artefactual, and documentary data, there needs to be a brief discussion of the limitations of the data, both inherent in each type of data as well as those unique to this research.

In addition to the depositional and environmental limitations discussed below, there is an addition inherent limitation of a monastic cemetery populations, as discussed above (Section 3.3.1), that it is not possible to know the link between the individuals recovered from the cemetery and the monastery or nunnery. It is possible that they entered the institution, in their early lives and spent their whole lives as part of the community, or that they joined towards the end of their lives. It is also possible that they were not monks or nuns but were servants, corrodories, patrons, or even members of the local population. Therefore, this discussion will use the phrase 'individuals associated with the institution' when discussing the individuals found in the monastic cemeteries.

5.1.1 Skeletal remains

The survival of skeletal remains and artefacts will be dictated not only by the circumstances of the original burial/deposition, but also by the soil composition, later animal activity, and the methods used during excavation (Roberts, 2009, p. 6-7; Gordon and Buisktra, 1981). The preservation of skeletal remains is affected by a number of factors, including the age of the individual (juvenile bones contain less minerals and so decay faster, while the bones of older individuals suffering from bone loss will also decay faster), the bone in question (denser bones and teeth are more likely to survive archaeologically), the burial method used (certain burial ceremonies including various types of embalming can preserve human tissue while others, such as the use of coffins, can actually speed up decomposition), and the environment in which the individual was buried (dry climates will slow the decomposition process, while wetter soils, provided oxygen is able to flow through them, will speed it up) (Roberts, 2009, p. 55-70). The sites included in this research range from 'rather poor' (Browne, 2004, p. 115) preservation (Keeping, 2000, p. 103), to 'good' (Jackson, 2006, p. 72; Stroud and Kemp, 1993, p. 160) to 'extremely well preserved' (Norton et al., 1998, p. 80). The other sites have a range of preservation, stretching from poor to very good (Holst, 2009; Browne, 1986, p. 1; Stirling ND).

Additionally, the information collected from skeletal remains will also be heavily influenced by the methods, and their date of publication, used to assess age, sex, and markers of disease and injury, as well as by the level of training and experience the researcher has had working with skeletal material (Roberts, 2009, p. 141-2; Waldron, 1994). In the case of this research, for example, the vast majority of the sites were excavated and analysed before, 2000 and several, including Clementhorpe and Elstow Abby, before the 1980s. The bioarchaeologists analysing the skeletal

remains used the most up-to-date methods of their time, but many of these methods have since been replaced or updated. The conclusions of this research, therefore, must be made with these limitations in mind, but a project such as this one, including so many different sites, would not have been possible to carry out without relying on these older analyses.

As discussed in Chapter 3, the various methods used to age and sex a skeletal individual can vary dramatically and will affect demographic profiles and their interpretation. Similarly, the methods researchers used to assess and document the different health indicators used in this research could have affected the final prevalence rates determined. The problem of interobserver error, i.e. the fact that two (or more) people will often record a lesion or attribute differently, is a limitation in any research using skeletal remains (Miller et al., 1996). Miller et al. found that some of the problems associated with such error were reduced when using larger categories to define the lesions, i.e. defining a lesion as 'trauma' rather than a particular type of fracture (1996, p. 224). However, with the exception of trauma, the health indicators selected for this research were far more specific and, so, introduced the potential limitation that while one research might define a particular lesion as osteoarthritis, another might not.

This is compounded by the fact that some of the health indicators selected for inclusion in this research are difficult to identify and have an element of subjectivity to their diagnosis. For example, maxillary sinusitis can only be assessed when the maxilla is either broken in such a way that allows the researcher to see inside the sinus or if they have an endoscope, a small, flexible camera. Osteoarthritis is also difficult to assess, as there is still much discussion about how the severity of the lesions is related to the severity of the disease itself (Seedhom, 2006; Salter, 1999; Jurmain, 1995; Rogers and Waldron, 1995; Sokoloff, 1969). In an effort to reduce the effect of these different methods, health indicators were only compared according to presence and absence, rather than using the various "severity" scoring methods available. As discussed in Chapter 3 (Section 3.3.2), questionable or less obvious lesions, as described by the original researcher, were not included. Similarly, lesions that do not meet the diagnostic criteria of a particular health indicator, i.e. lesions consistent with DISH must affect four or more vertebrae, were also not included.

The decision to use data that had been collected and reported on already, instead of conducting the primary skeletal analysis itself during the course of this project was made for a number of reasons:

1. Several of the skeletal collections from nunneries have been reburied, some due to storage issues and others because it was the wish of the landowner, and so it was not possible to analyse them firsthand (pers comm Helen Rees 16/05/2011; pers comm Malin Holst 15/10/2009; Jackson, 2006, p. 72).

2. It allowed for more sites to be used in the research overall, such that the total number of individuals included would have been fewer if the primary analysis had been carried out as part of this research.
3. If the primary analysis had been done, the inclusion of the artefactual and documentary evidence would have proved impossible within the scope and time restraints of the research. As this had to be a multidisciplinary study, this was unacceptable.

However, relying on a number of people's skeletal analyses brings with it a number of problems. For example, the issues relating to relying on data produced by different age and sex estimation methods have been discussed in Chapter 3, as has the issue of subjectivity in identifying the various health indicators. Some of the problems were reduced by the broad age categories used, and the decision to use only presence and absence in the comparison of health indicators.

Differences in excavation practices can also have an effect on the recovery of the bones, teeth, and other skeletal material (Roberts, 2009, p. 78-9; Moffet, 2006; Serjeantson, 2006, p. 133; Hunter and Gassner, 1998). For example, the use of very fine mesh sieves and wet sieving will recover smaller bones and teeth than larger mesh sieves (Moffett, 2006; Serjeantson, 2006, p. 133). These differences could result in, for example, fewer teeth being recovered from the excavations that only used large sieves. This could have affected the prevalence rates of the dental health indicators or the composition of the artefact assemblages. However, these problems are inherent in any archaeological or bioarchaeological study that is not carried out by the same excavation unit and, given the availability of funding for large scale excavation, these problems will continue. It is, however, important to be aware of these factors when comparing different sites.

A further limitation brought on, in part, by the fact that these sites were all excavated by different people, at different times, and for different reasons, is the fact that the vast majority of the skeletal remains from these sites are not dated (or rather do not have a recorded date) more precisely than the "medieval period." This information is available in Appendix C. This means that there was no way to analyse how the quality of life of the inhabitants of these religious houses might have changed over the 500 year period that is the focus of this research. As briefly discussed in Chapter 1, this period was one of significant social, technological, and political change and these changes would surely have affected the quality of life of people from all walks of life. It is unfortunate that there was not the possibility to delve further into the affects these changes had on the quality of life of the inhabitants of religious houses.

5.1.2 Artefactual evidence

As discussed in the above paragraph, differences in excavation processes can have a substantial impact on the recovery of artefacts, particularly the smaller artefacts (Graesch, 2009, p. 776; Dibble

et al., 2005, p. 317). The areas of a site selected for excavation will have an impact of the types of artefacts recovered from a site (Orton, 2000, p. 49). Additionally, inexperienced excavators may throw away artefacts that do not at first glance appear to be genuine artefacts, as can often be the case with stone tools or other objects that require more than a cursory glance to determine their original form (Dibble et al., 2005, p. 218). Once excavated and put into storage, preservation of the artefacts and the associated documentation can be negatively affected by a lack of care or money in the collection as a whole (Dibble et al., 20005, p. 318).

The preservation of organic materials including the bones of non-human animals, wood, and plan material will depend on forces similar to those discussed above (Andrews and Fernandez-Jalvo, 2012; Bartosiewicz, 2008). Inorganic materials, including metal, ceramic and even stone, can also have their preservation and/or archaeological recovery affected by environmental factors, including the movement of soil by plants and animals, as well as soil composition, for example high levels of acid (including naturally occurring and artificially introduced via acid rain), salt, and other chemicals such as nitrogen and sulfur, which can have a detrimental effect of the survivability of a variety of artefacts (Nord et al., 2005; Hiscock, 2002; Gerwin and Baumhauer, 2000).

A limitation inherent in research of this type, i.e. that of analysing different types of artefacts, also has its own limitation. Interobserver error, as discussed above in relation to descripting skeletal lesions, is similarly at play when ascribing artefacts into various types (Gnaden and Holdaway, 2000, p. 740). In this research, for example, the two artefact classes of Dress Accessories and Jewellery could have significant overlap. Hairpins, while necessary for the wearing of the nun's (and other medieval women's) wimples, could also be highly decorative. The decision was made, for this research, to categorise all hairpins as Dress Accessories, regardless of their decoration. Another researcher might have chosen to only include those plain pins as Dress Accessories and the more decorative pins as Jewellery, which could have changed the proportion of either class. As such, the comparative analysis and subsequent conclusions could vary between researchers.

The limitations affecting the artefactual evidence, therefore, include those biases present at excavation, storage, and analysis. As with the human skeletal remains, however, these biases are present in all artefactual analysis and as such should not a deterrent from carrying out artefactual analysis, but must be considered when drawing conclusions. The final limitation, that of interobserver error, was somewhat lessened by the fact that each artefact was first described by the original excavator (although not always), then by the researcher and/or accessions officer, occasionally by a finds specialist, and finally by the author. As such, each artefact was categorised by at least two individuals. Where there was disagreement between the author of this research and the original archaeologist as recorded in the published excavation report or the unpublished notes, the decision was made to err on the side of the originally research as the experience of those

intimately involved in the original excavation and analysis was far greater than that of the author. That being said, no substantial disagreement between the classifications of artefacts was encountered.

The final limitation associated with both the excavation of skeletal and artefactual remains is the areas actually excavated. In terms of the sites used in this research, the majority included the church or at least parts of it, but a few, specifically St James' Priory, Sinningthwaite Priory, and, to a lesser extent Hulton Abbey and Nunnaminster, only had smaller excavations that focused primarily on the church and had only limited trenches in other parts of the precinct. These four sites are fairly evenly split between the various groups being compared, with the exception of the northern and southern comparison. This does not negate the limitation associated with the difference in size of the excavations, however, and this was kept in consideration with the conclusions drawn.

5.1.3 Documentary evidence

The documentary evidence will, similarly, be affected by how much contemporary written data were available originally, as some houses will have left a larger documentary footprint than others, where it was stored following Dissolution, and the interest the documents generated when re-discovered (Bell, 2007, p. 116). The more interest in the documents, the higher the chance that they will be properly archived and then later incorporated into the kinds of cohesive studies that bring them to the attention of non-specialist researchers.

This is further compounded by the problem that, as with any organic material, parchment, which is made from animal skins, is subject to decay (Dolgin et al., 2007). While the parchment would have been treated both when originally created and later when accessioned by a museum or other organisation, the decay of these documents is only slowed, not stopped (Dibble, 2005, p. 318-9). Many documents were copied later and so these copies survive, but any documents that were not found to be interesting or worth the time could easily have been overlooked.

In addition to this, it should be noted that the content could contain mistakes when originally written, exaggerations or underestimates about the extent of ownership or wealth, and even have been mistranslated by researchers (Knowles, 1976, p. 171-4). As such, the information recovered from historical documents must be viewed with the understanding that simply because it is written does not mean that it is true, but is rather a representation of what was believed to be true.

The specific limitations of both the *Valor Ecclesiasticus* and the *Monasticon Anglicanum* were discussed in Section 3.5, but the more general limitations of using documentary evidence will be discussed here. These limitations usually revolve around the fact that these documents were not

written for use by historians to reconstruct people's lives, but rather as a way of recording some information for a specific reason. In this case, the reason that the charters and the *Valor* were created was to ensure that a full account of finances were available to the interested parties, i.e. the monastic accountants, the King, and his representatives. These documents were, however, intended to be read and scrutinised. They were intended to provide cold, hard data about the financial situation of the monastic houses. However, the people putting together these documents had their own reasons for not wanting to accurately reveal the income or value of the house in question.

Similarly, the charters collected in the *Monasticon* were similarly created for a specific purpose, to record the financial status of an institution at a particular moment in time. These documents were not intended to provide an exact record of the financial status of their house, but rather to create a reference for the people using them. That being said, they provide a valuable insight into some of the financial holdings of these institutions.

In addition to the limitations inherent in the data, there are also the limitations of the research that must be taken into account. This research project, due to time and budget constraints, was only able to assess eight monastic houses. While further sites would have allowed for more surety in conclusions, it would have been difficult to complete in the time provided. The decision to restrict the focus to monastic sites rather than to include some lay sites was made both in the interest of maintaining the focus of the research as well as the time constraints. This research is not and was never planned to be about assessing quality of life for the medieval population at large, but to explore differences between monastic communities. By limiting the focus, it was hoped that it would be possible to assess the quality of life of the inhabitants of medieval monastic institutions using more sites and data than would have been possible if lay sites had also been included.

This chapter has five primary sections. The first four will explore the implications of the data addressing quality of life identified for the inhabitants of (1) Nunneries and Monasteries, (2) Northern and Southern Houses, (3) Urban and Rural Houses and (4) Older and Reform Orders, as discussed in the previous chapter. The final section will address the research question of whether it is possible to detect any inequality in the quality of life between the different types of religious house.

The phrases high and low quality of life as well as good and poor quality of life are used throughout this chapter. High and low (or higher and lower) quality of life is used to describe the relative quality of life at one type of religious house compared to another. It is a comparative term. The terms good and poor quality of life are used, on the other hand, to describe the situation for the inhabitants of these religious houses using the combined results of the skeletal, artefactual and documentary data. Each section will begin with a brief overview of the characteristic being

discussed, followed by a summary of the results. This summary will only include that results that were statistically significant as a full summary would be overly long.

5.2 Nunneries and Monasteries

The experiences of male and female religious groups in medieval England could be vastly different. Societal expectations and preconceptions for both sexes meant that expectations regarding their behaviour, interaction with society and perceived religious contribution heavily influenced their potential quality of life (Farmer, 2002, p. 130; Dyer, 1998, p. 274-5; Howe, 1997, p. 1; Szalai, 1980).

The perception of the significance of religious contributions of men and women living in religious communities in medieval England was such that men's prayers and other religious acts were thought to carry more weight (Weinstein and Bell, 1982, p. 220; Burton, 1979, p. 2). As part of this perception was the belief that women were inherently sinful, due to their link with Eve (Synnott, 1997, p. 44; Gilchrist, 1994, p. 15; Cadden, 1993, p. 24, p. 163; Bynum, 1991, p. 156). The result of this was that the religious contribution of nunneries was less valued than that of monasteries and therefore fewer nunneries were granted large endowments (Bond, 2003, p. 75; McNamara, 1996, p. 263; Bell, 1995, p. 78; Bynum, 1987, p. 223).

Women in the larger medieval society were also not allowed as many political and social freedoms as men; for example, women were not allowed to hold property unless they had no male relatives to take control of it, and were limited in their right to argue their causes within both the ecclesiastical and secular court systems (Herder, 2005; Berman, 2000; McNamara, 1996, p. 271; Brundage and Makowski, 1994; Power, 1922, p. 234). As such, nunneries were less able to assert their rights and claims, leaving them at a disadvantage in resolving any conflicts that could so easily arise when dealing with large tracts of land and other holdings (Hawkes, 2000, p. 149; Makowski, 1999; Brundage and Makowski, 1994). Of course, several nunneries (and individual nuns, prioresses and abbesses) were able to win court cases and assert their rights within both the secular community in which they lived, and through the network of religious houses in their area (for examples see VCH 1974 and 1904). However, these cultural and societal preconceptions were difficult to overcome and the vast majority of religious women simply lived within the rules and mores of their world.

5.2.1 Summary of results

(i) Nunneries

Among the people buried at the nunnery sites, both dental calculus and dental caries were found in higher prevalence rates (both corrected and element-wise) than in the male monastery populations. Dental caries having been linked to high protein, possibly suggesting a diet linked more closely to a high status diet in the medieval period (Castilhos et al., 2012; DeWitte and Bekvalac, 2010; Van

der Velden et al., 2006; Bond, 2004, p. 183-210; Harvey, 2002, p. 46-51; Lieverse, 1999, p. 224; Dyer, 1989, p. 154; Larsen, 1983). The higher rates of dental calculus, however, could also suggest a high protein or high carbohydrate diet (Lieverse, 1999, p. 224). As bread was a staple of the medieval diet, the higher prevalence rate of dental calculus is not conclusive on its own (Davies, 2004; Harvey, 1995, p. 59; Dyer, 1989, p. 57).

Additionally, the higher rates of both dental calculus and caries at nunneries could be an indication that the individuals at the monasteries could have been practicing better oral hygiene than those at the nunneries. Oral hygiene was not entirely unknown in the medieval period (Fischman, 1997). The most common method for cleaning one's teeth before the eighteenth century was mouth-rinsing, although toothbrushes and even floss had been written about in ancient medical and religious texts (Hyson, 2003, p. 73-4; Fischman, 1997, p. 7). It is unknown how prevalent the practice was and, although there were no other archaeological remains of brushes or scrapers at the other sites in this collection, differences in dental hygiene cannot be wholly discounted as a possible reason for the difference in prevalence rates.

Another practice that would have decreased the levels of dental calculus and caries in the monastery population is the consumption of foods high in fluoride. The use of fluoride in toothpaste and tap water in living populations has been shown to reduce both and it has been postulated that a high consumption of seafood, which is high in fluoride, could have offered some protection from these and other dental problems (Sibbison, 1990). A study of fluoride in everyday foods (in Winnipeg, Canada) showed that fish has approximately 2.118mg/kg of fluoride (depending on the species) while tap water with added fluoride has 4.970mg/kg (Dabeka and McKenzie, 1995, p. 906-7). Fluoridated tap water is thought to provide protection against dental caries, but it is not clear at what level fluoride becomes detrimental to health (Malde et al., 2011; Cheng et al., 2007; Erdal and Buchanan, 2005; Watts and Addy, 2001; Sibbison, 1990). As such, it is not unreasonable to think that a population consuming large quantities of seafood, as would have been expected from those following the dietary suggestions in the Benedictine Rule, would have had some level of protection against dental caries, although the level to protection this would have offered is not known (Malde et al., 2011; Hillson, 2005, p. 169; Roberts and Manchester, 2005, p. 66).

Two of the four monasteries in this research, Hull Austin Friars and St James, Bristol, were located within reasonable distance to the sea, while none of the nunneries were coastal. That being said, Stoke-on-Trent, York and Winchester, with the monasteries St Andrew's Priory and Hulton Abbey and the nunneries Clementhorpe and Nunnaminster respectively, were trading cities with navigable rivers (Dyer, 2009, p. 215; Langdon, 1993, p. 3; Edwards and Hindle, 1991, p. 3). If the houses in these cities are included as having good access to seafood, that increases the number of monasteries

with reasonable access to seafood to four and the nunneries to two. This casts doubt about high dental caries as automatically conferring high status on the individuals found at the nunneries sites. One potential conclusion would be that the inhabitants of the nunneries were eating higher volumes of carbohydrates and less seafood then their counterparts in the monasteries. The higher volume of carbohydrates could have increased the likelihood of the inhabitants to develop both dental caries and calculus, while the lower intake of seafood would have given them less protection from dental disease.

Another health indicator with a higher corrected prevalence rate in the nunnery population was maxillary sinusitis, a condition associated with poor air quality (Roberts, 2007; Slavin et al., 2005; Merrett and Pfeiffer, 2000; Panhuysen et al., 1997). This could indicate that the living conditions in the nunneries were not as good as in the monasteries, although corrected prevalence rates are far less reliable than element-wise prevalence rates when trying to determine population health (Section 3.3.2). In living populations the 'most common cause of sinusitis is infection' (Slavin et al., 2005, p. 521). Whether the high prevalence rates of sinusitis in the nunnery population is the result of poor environmental conditions, dental disease, or a combination of both, it suggests that the living conditions at the nunneries, in comparison to the monasteries may have been poorer.

The final health indicator with higher prevalence rates (both corrected and element-wise) in the nunnery population was that of osteoarthritis, which is more common in females than males in the general, living populations (Weiss and Jurmain, 2007, p. 438; Pottie et al., 2006; Seedhom, 2006; Hunter et al., 2005; Cooper et al., 1998). Osteoarthritis is an affliction with a complex and not altogether understood aetiology, although obesity, activity and ageing are all thought to play a part (Weiss and Jurmain, 2007, p. 438; Pottie et al., 2006; Seedhom, 2006; Hunter et al., 2005; Cooper et al., 1998). At the monasteries, a higher percentage (13.6% vs. 9.3%) of males than females were found to have been affected by OA, and this was also true at the nunneries (50.5% vs. 37.0%). For both, the largest age group affected was the 45+ group (monasteries = 49.0%; nunneries = 55.7%), followed by the 35-45 age group (monasteries = 26.1%; nunneries = 14.0%).

This would suggest that age most likely played a large part in the high prevalence rates of osteoarthritis. However, the 45+ age group for nunneries made up 23.2% of the total and 21.0% of the monastic population, suggesting that this is unlikely to have been the main factor in the significant difference in the higher prevalence rate at the nunneries. This suggests that it could have been a lifestyle difference, including the possibility that it was activity or obesity related. These two possibilities are obviously the result of two very different lifestyles. The high prevalence of OA at the nunneries, when taken in conjunction with the high dental calculus and caries rate could indicate that a high status diet led to higher rates of obesity related osteoarthritis at the nunneries, however, the fact that a higher percentage of males than females had suffered osteoarthritis could

indicate that the individuals associated with the nunneries, either as patrons, employees and/or those living in neighbouring villages, had obesity or activity related osteoarthritis. In short, with a disease with such a complex aetiology it is difficult to be more specific about the cause. However, it is likely that the different prevalence rates at the monasteries and nunneries were down to a lifestyle difference, rather than the age of individuals.

The nunneries studied were found to have high proportions of dress accessories, horse paraphernalia and household items. It was not surprising that the majority of the dress accessories were pins, as they were used as clothing fasteners by all social strata and would have been used by both nuns and lay women to fasten their wimples. The household artefacts were mainly generic cooking utensils and, although normally associated with what have characteristically been perceived as women's tasks, probably do not indicate any specific behaviours that would have impacted the quality of life of the inhabitants, as most would have employed servants. Artefacts relating to horses, however, are typically associated with high status in the medieval period, as horses would have been expensive to keep (Clark, 2004, p. 8; Langdon, 1982). That being said, horses would have been necessary for transport as well as for use in some social situations. In short, the artefact classes found in significantly higher proportions at the nunneries reveal little about the quality of life experienced by the inhabitants.

The financial data for the four nunneries included in this had, on average, a higher suppression value than the three monasteries (and one friary), but a lower average pension. However, when the religious houses within the *Monasticon Anglicanum* were compared using their suppression value, monasteries were found to have a significantly higher value. The suppression value of the nunneries in this research may be being distorted by the high suppression value of both Elstow Abbey (Bedford) and Nunnaminster (Winchester). The higher average pension for the monks found, however, could be indicative of the societal value placed on male religious contribution over female and/or the belief that, presumably, a women would not need an independent income as she would have been taken care of by her family. However, very few nuns actually married after the Dissolution; for example, Knowles estimates only 29.5% of nuns in Lincolnshire married, and many of these marriages were to former monks (1959, p. 413).

(ii) Monasteries

There were no health indicators found to have significantly higher prevalence rates within the monastery populations when compared to the nunnery populations. The artefact classes found in high proportions in the monasteries were not surprisingly those primarily associated with monastic life, for both monks and nuns, i.e. religious paraphernalia, writing and reading implements and artefacts associated with craft work, and agricultural tools. The hygiene class of artefacts was also found in high proportions, but the majority were combs or comb blanks found at St Andrew's

Priory, York, possibly suggesting some kind of comb production. The artefact classes found in significantly higher proportions at the monasteries, unlike the nunneries, suggest that the activities that were socially expected of monks were being carried out at these sites. This could be interpreted as contributing to a high spiritual quality of life, in that the tasks laid out in the Benedictine Rule were being achieved (St Benedict, 1990, p. 69-70). The proportion of individuals actually involved with these tasks, however, is unknowable.

5.2.2 Contemporary views of the lives of monks and nuns

As discussed in more detail in Chapter 2 (Section 2.4.3), contemporary views of monks and nuns (and monasteries and nunneries) in England varied through the medieval period. Depending on the order to which they belonged, monks could be viewed as indulgent or as spiritual pioneers (Press, 1971; Banks, 1904). By the end of the period, however, the lustful, greedy, arrogant and/or over educated monk is common in the literature (Anonymous, 1995; Boccaccio, 2008*;* Anonymous, 1925; Chaucer 1894*;* Langland, 2008; Lindsay, 1989). This suggests that, while there were exceptions, medieval people were familiar with the idea of such a monk and may have viewed all monks with reference to this image (Patrick, 2004, p. 27-28; Streicher, 1967, p. 443). This does not mean, however, that all people saw all monks in this clichéd image. Duffy recounts the story of a young man asking his father, given that he thought well of the monks, why had he bought up some of the timber and other building materials when Roche Abbey (Yorkshire) was dismantled. He replied that it did not matter what he thought of the monks, but that the material was going to be disposed of and that he might as well profit from it as his neighbours were doing (Duffy, 2001, p. 90-1).

Nuns were also portrayed in popular literature differently in the eleventh century compared to the sixteenth century. Early works feature nuns as tragic figures, locked away, often as a result of some tale involving a lost love (Press, 1971; Anonymous, 1988a; Anonymous, 1988b). There were also many humorous tales of lustful nuns either running from their duties or somehow conniving to bring men within the walls of the nunnery to carry out some kind of torrid affair (Banks, 1904; Anonymous, 1988b; Anonymous, 1995). By the end of the period, this portrayal is no longer carried out with such humour and is more often a critique of a group of women viewed as vain and without morals (Boccaccio, 2008; Chaucer 1894; Langland, 2008; Lindsay, 1989; Anonymous, 1988b).

5.2.3 Results in light of contemporary views

By the end of the medieval period there was a popular, contemporary literary trope of monks as wealthy and greedy. In the course of this research, it has been established that male houses were, on average, wealthier than female houses, suggesting that the view of monks as wealthy was not entirely without evidence. The fact that the particular monasteries studied in this research, when

compared with the nunneries, were in fact poorer, illustrates the importance of a case-by-case analysis.

The evidence, however, did not uphold the contemporary view of monks as greedy and indulgent. There were no health indicators found in significantly high proportions that would suggest a high status diet, i.e. DISH, calculus, dental caries. As discussed in previous chapters, DISH has an aetiology that is not fully understood but a diet high in protein and fat is thought to be a potential contributory factor (Spencer, 2008; Kiss et al., 2002, p. 29). A similar diet could also result in the development of high rates of dental calculus, by changing the pH of the saliva (Haffajee et al., 2009, p. 512; Lukacs and Largaespada, 2006; Kinane, 2001, p. 9; Lieverse, 1999, p. 219; Masalin and Murtomaa, 1992). Dental caries are well known to be influenced by a diet high in refined sugar in living populations, but the risk of developing dental caries in a medieval population would have been increased by the consumption of 'white' bread and sugars (DeWitte and Bekvalac, 2010, p. 8; Dyer, 2009; Hammond, 1995; Davis, 2004; Wilson, 2002; Woolgar, 2001; Harvey, 2002). The most extensive study of the monastic diet, that of Barbara Harvey, suggests that a diet high in protein, fats and sugars would not have been unknown in the wealthier institutions (Harvey, 2002, p. 70).

Likewise, high status artefacts were not found in higher proportions at the monasteries studied. The artefacts associated with the monasteries, in fact, supported the monastic ideal of being engaged in some kind of labour, whether it be reading, writing or some kind of agricultural or craft production. As with monasteries, by the end of the period, nunneries were thought of as wealthy and fairly indulgent. Contemporary religious individuals, however, including visiting bishops, were aware of the poverty of many of the houses, even while admonishing the nuns for wearing jewellery and gowns. The high percentage of dress accessories could be evidence of this particular proclivity, but as the majority of these items are pins, this seems unlikely.

However, the high proportion of people with dental caries and calculus could be evidence of a diet heavy in protein and sugars, a diet that has been associated with high status or wealth in the medieval period (DeWitte and Bekvalac, 2010; Hammond, 1995, p. 58-4; Harvey, 2002, p. 34; Dressler and Bindon, 1997, p. 56; Masalin and Murtomaa, 1992; Dyer, 1989, p. 58). This could be evidence of the high status diet that the Prioress enjoys in 'The Gout and The Flea' (*Alphabet of Tales*). Whether these high rates are indicative of a high status diet due to the higher income of the nunneries included in this study or the typical lifestyle within a nunnery is unclear.

The health indicators found in higher frequencies at nunneries suggest that the environmental conditions at nunneries may have been poorer than at monasteries. This could have been a result of poor air quality due to remaining indoors with smoky fires or to spending long periods of time in

low temperatures, possibly due to inadequate clothing and/or shelter (Slavin et al., 2005, p. 519-524). This could be taken as evidence of inadequate provisions at these institutions, as discussed by visiting bishops (Herder, 2005, p. 234; McNamara, 1996, p. 272, p. 359; Bell, 1995, p. 9; Burton, 1979, p. 11; Snape, 1926, p. 149; Power 122, p. 161-236). The higher proportion of osteoarthritis at nunneries, similarly, could be the result of some aspect of the lifestyles of the individuals within the nunneries that made them more prone to developing OA.

Due to the inconsistency with the Dissolution values of the sites included in this research and the national average, it is concluded that income rather than the sex of the inhabitants appears to have had a stronger influence on the quality of life of the inhabitants of monasteries and nunneries. Given that, on average, monasteries were wealthier than nunneries, it is possible that monks enjoyed a higher status life than nuns, on average, but a larger sample size is needed to make any further conclusions.

5.2.4 Quality of life at monasteries and nunneries

As discussed in Section 2.3.3, the question of quality of life in the medieval period is two-fold. The idea of quality of life in the modern sense includes ideas relating to reasonable health, ability to interact with society, and many others. Medieval quality of life, on the other hand, includes ideas about the state of one's soul (see Section 2.3.3). For many medieval philosophers and theologians, having a good spiritual quality of life would have necessitated what people today would think of as poor physical quality of life, in that it was believed that physical discomfort and pain during life could act as penance for any sins committed (Mowbray, 2009, p. 65; Lambert, 2002; Synnott, 1997, p. 16; Turner, 1996, p. 88-9; Asad, 1983, p. 305). Therefore, this section will first discuss what this study found in relation to physical quality of life, in the modern sense, followed by a discussion of how this may have impacted their perceived spiritual quality of life.

(i) Physical quality of life

In the monasteries, there were no health indicators that were found in significantly higher proportions, as indicated in skeletal remains. As such, the assumption is not that these individuals had better health than those in the nunneries, but rather that their lifestyle was such that it left no indication of either extreme hardship or luxury. According to Wood et al. (1992), there could be some individuals in this population that died in relatively good health, their bodies able to fight off infection and disease without showing any record on the skeleton. There could also be individuals who were in such poor health that they died before there could be any reaction on the skeleton. This is one of the greatest problems in bioarchaeology, that the difference between these two potential subsets of the overall population cannot be identified. Therefore, it can be suggested that the health of the individuals buried at the monasteries in this study was not so bad nor was their lifestyle so good as to affect their skeletons; in short the health indicators suggested neither

extraordinary high nor low levels of disease or physical ailment, in relation to the nunnery populations studied.

Although this research does not focus on comparing quality of life in lay communities, other research has done just that. Keeping (2000, p. 202) found that, by comparing skeletal remains from monastery, nunnery, and lay populations, that women buried in the cemeteries associated with monasteries and nunneries show less sign of nutritional hardship or stress than their lay counterparts. She suggests that they may have had access to better diets, living conditions, and may not have been as subject to some of the other stresses associated with life in the medieval period, including childbirth and physical labour (*ibid.)*. Similarly, Patrick (2004, p. 395) found in her study of the health of monks that, compared to the lay population, men buried in monastic cemeteries had better nutrition and health as children, as evidenced by their increased stature.

It is interesting to note that Mays (2007, p. 191), in his analysis of the human remains uncovered at the medieval village site of Wharram Percy, found that there was little difference in the health indicators between the sexes. One of the only differences was found in the areas affected by osteoarthritis, where males were found to have higher rates of OA in the lower limbs while females were found with higher rates in the upper arms (*ibid.)*. Mays attributes this to the differences in labour between the sexes (*ibid.)*. He also echoes the idea that more women than men were migrating to urban centres, both before and after the economic instability following the Black Death, to fill a labour void in the cities (Mays, 2007, p. 191).

The artefact assemblage associated with the monasteries, with a high proportion of reading/writing artefacts and tools associated with agriculture and crafts, suggests a population engaged in activities expected of religious communities. In addition to this, the ability to read and comprehend as well as write, rather than simply copy, was a skill set possessed by only a small segment of medieval society; although this changed through time and according the sector of society examined, with urban merchant and some artisan populations having a greater literacy towards the end of the Middle Ages (Gilchrist, 2012, p. 147-8; Bell, 2007, p. 121; Dyer, 2002, p. 103). Many people, both lay and monastic, who could read but not write, and may have only understood a fraction of what they were reading. Additionally, many monks and nuns who could write could actually only copy down the texts placed in front of them and were not able to compose anything themselves (*ibid.)*. The ability for even some of the individuals associated with the monasteries to do any combination of these things would have allowed them to interact with the legal, political, ecclesiastical and literary aspects of society more effectively than a community lacking these skills.

Although the Dissolution values of the monasteries studied were lower than those from the nunneries, the pensions granted to the monks, an average of £4, was roughly the equivalent of the

wage of an unskilled labourer, with a skilled labourer bringing in up to £6 per year. This would have allowed those individuals to survive, but possibly not to maintain a high quality of life in the medieval period (Dyer, 2009, p. 240; Knowles, 1959, p. 407). When compared with the estimated cost to support a monk at university, approximately £10 annually in the sixteenth century, it can be suggested that this may not have been intended to be their sole income (Snape, 1926, p. 106). The combination of these pieces of evidence, relatively "average" health, the ability to read and/or write, and a living wage, although not a particularly high one, is suggestive of a subset of society with a reasonable quality of life.

The evidence for the nunneries presents a more confusing picture. To take the health indicator information at face value would suggest a poor living environment with a potentially high status diet. The higher status diet could be a reflection of the higher Dissolution value of the nunneries, while the higher proportion of individuals with maxillary sinusitis, whether due to dental disease, high particulate levels and/or infection, could be a reflection of the lower standard of living conditions (Roberts, 2007; Slavin et al., 2005; Merrett and Pfeiffer, 2000; Panhuysen et al., 1997). Given the lower average pension granted to the nuns at the four nunneries studied, this could be a reflection of the cultural value placed on their religious contribution, which may have resulted in lower investment in nunneries as a whole.

Several scholars have also noted the poorer management of waste disposal at nunneries, something that would not directly result in maxillary sinusitis, but could rather be evidence of a larger problem in maintaining a healthy environment at nunneries (Bond, 2003,74; Bond, 2001, p. 56; Gilchrist, 1994, p. 125-6; Coppack, 1990). However, if this were an endemic problem, there would be an expectation of higher prevalence rates of non-specific infection within the nunneries' population, which was not found. Monasteries, on the other hand have been described as having 'placed tremendous emphasis on sanitation' (Gilchrist, 1994, p. 115). According to Coppack, one of the most important aspects of deciding on a site for a new monastery was the provision of water for drinking, washing, and to flush drains (1990, p. 81). The priory of Wigmore in Herefordshire moved three times in order to ensure they had the water they needed (*ibid.)*. Coppack goes on to assert that 'clean water and good drains were central to the monastic ideal' (1990, p. 99). Ideally, the setting, layout, and evidence for waste management would have been included in this research, but the lack of evidence for two of the nunneries, Sinningthwaite Priory and Clementhorpe Priory, as well as the time constraints ruled out such comparison (see Appendix C).

As with the monastic population, the high prevalence rates of maxillary sinusitis may not be an indication of poor health, but rather of individuals who were healthy enough to fight off infection for long enough that it resulted in bony changes (Wood et al., 1992). The fact that there was maxillary sinusitis present in the population indicates that there could have been some problems in

the environmental conditions at the sites, although again, it would be expected that higher rates of NSI would also be present were this the primary cause. When examined in reverse, however, the lower levels of maxillary sinusitis in the populations associated with monasteries could be a reflection of a lower level of particulates in the air as a result of the lack of heating in the monks' dormitories (Kerr, 2009, p. 22).

Either way, when taken in conjunction with the documentary evidence it is suggested that poor environmental conditions may have a problem at nunneries and could have lead to higher rates of maxillary sinusitis.

Interestingly, in a study of three sites in Belgium, it was found that the nunnery population was broadly similar to general adult population in terms of their rates of maxillary sinusitis (Panhuysen et al., 1997, p. 613). However, when compared with lay medieval sites in England, the 8% corrected prevalence rates found within the nunnery populations in this research is much lower than the 17/18% (male/female) found at Christchurch, Spitalfields, London, the 54/55% found at Chichester, Sussex, the 51/45% at Fishergate House, York, and the 75/69% found at St Helen-on-the-Walls, York (Roberts, 2007, p. 799). All of these sites date to between the 12th and 16th centuries, suggesting that, although the nunneries had a higher prevalence rate of maxillary sinusitis than the monasteries, both were well below the prevalence rates for the lay population (Roberts, 2007).

Suggesting what the implication for quality of life for the inhabitants of these nunneries is challenging and problematic. While the higher Dissolution values and evidence for a high status diet indicate a higher quality of life than that experienced at the monasteries, the high proportion of people with maxillary sinusitis suggests a poor living environment, and the low pensions granted suggest a lack of value placed on the nuns by society at large which would indicate a potentially low quality of life. The higher number of apostates at these four nunneries could also suggest dissatisfaction with the religious life, although nunneries as a whole had a much lower rate of runaways than monasteries as a whole (Logan, 1996, p. 71). Add to this the potential problems with inferring high status from dental disease, as discussed above (Section 3.3.2 ii), the picture is even more confusing. While the monks' quality of life was found to be neither good nor poor, the quality of life in the nunneries appears to have had aspects representing both poor and good quality of life.

The reason for this ambiguous result may be that the limitations in the data, i.e. insufficient numbers of individuals/sites, lack of primary analysis, etc., prevents clearer data resulting. On the other hand, it may be that there was little difference between the quality of life at monasteries and nunneries and that any differences are the result of other influences, possibly including those discussed below. Another possible reason is that the variables that impact an individual's or

group's quality of life are so multi-faceted that one aspect of their lives could be poor while others are good. The example for this would be the modern equivalent of someone living in a wealthy neighbourhood with a good job and income, but who only eats fast food and does no exercise. Their socio-economic and cultural quality of life may be quite good, but their physical or health-related quality of life would be poor.

This could be a result of societal limitations on the activities of women, including nunneries. Many nunneries struggled to maintain independence in their business affairs and did not have the same freedom as their male counterparts (Makowski, 1997). This could have resulted in an inability to use their wealth to benefit the inhabitants of the nunnery. However, as the nunneries included in this research represent both poor and rich institutions, and there is less disparity between the wealth of the monasteries, the presence of health indicators associated with both high and low quality of life within the nunnery population may represent the differences in wealth between these four institutions.

(ii) Spiritual quality of life

Although a deeply personal issue, both today and in the medieval period, the question of the relationship between the body and soul is and was a focal point for philosophical and theological writings and debate (Mowbray, 2009; Grudzen, 2007, p. 202; Ziegler, 2001, p. 9; Synnott, 1997, p. 1-13; Turner, 1996, p. 88; Asad, 1983). Unlike in the modern, Western world, the Church and its representatives had significant power, both over large political debate and smaller community decisions. It would have been expected that writings endorsed by the Church be taught in every church in Europe and would have spread, albeit slowly, through preaching on the street as conducted by those belonging to mendicant orders and the return of monks and canons from their time at university back to their monastic houses, including those who would have been sent as priests to nunneries. Therefore, while it is patently impossible to know what people individually believed about their own body/soul relationship from the archaeological and historical record, a case can be made that people would have been exposed to those teachings that the Church endorsed. Although the library holdings varied considerably between monastic institutions, public sermons, miracle plays, wall paintings, burial practices, and communication with visiting bishops would have ensured that people were aware of some of those ideas supported by the Church (Gilchrist, 2012, p. 32). This endorsed message, that the soul was more important than the body and that it benefited from the body undergoing deprivation and, sometimes, punishment, will therefore be used as a marker for the spiritual quality of life of the inhabitants of the monasteries and nunneries in this study (see Section 3.3.3).

There would have been benefits to both sexes in joining a religious institution in terms of both spiritual and physical quality of life. For example, a laywoman would have been spared the huge

risk associated with childbirth at this time by joining a nunnery. Laymen would have also been spared the risk of warfare (amongst the noble classes) and the risks associated with farming and industrial processes (for those from the working classes), although farm labour and industrial processes were not unknown to be practiced by monks and other inhabitants of monasteries, as evidenced by the presence of artefacts associated with these activities within the monastery assemblages. The inhabitants of monasteries would have had, in the eyes of the Church, a reasonably high spiritual quality of life compared to those at nunneries, given their average quality of life and evidence of carrying out physical labour, but a high value was particularly placed on their spiritual contribution. The nunneries, on the other hand, would have had only a lower spiritual quality of life, given that, while their environment was poor, their diet was potentially indulgent and their value in the eyes of the Church was less than that of monasteries (Gilchrist, 1997, p. 43; Synnott, 1997, p. 44-6; Cadden, 1993, p. 163; Bynum, 1991, p. 156; Brown, 1988, p. 19; Bynum, 1987, p. 193). As such, an individual would have been potentially better off, both physically and spiritually, joining a monastery rather than a nunnery.

5.3 Northern and Southern Houses

Although not a geographically large country, England still has climatic zones that can alter the way an area is perceived, and the experiences of the people within these areas. One of the most frequently discussed is the North/South divide. As discussed in Section 3.2.3, the North of England was defined as the area north of the Humber River. For example, a report on weather-related deaths in, 2007 found that people, especially older people, were more at risk for heat-related deaths in the South, specifically London, than anywhere else in the country (Hajat et al., 2007). The North and East were similarly found to have more cold-related deaths than other parts of the county (*ibid.)*. In her sample of medieval cemetery sites, Keeping (2000, p. 184) found that once an individual reached the age of 20, they could expect to live another 23.5 years in the south, but only 17.6 years in the north, a difference of approximately six years.

The North of England, the area north of the Humber River and south of the Scottish Border, experiences an average temperature in winter of 4.3°C degrees and 29.9 days of air frost (all data collated for the years 1971-2000), while the South averages approximately 5.5°C with on average 25.4 days of air frost (Met Office, 2012). The North also experienced 89 more centimeters of rain per year than the South and, perhaps unsurprisingly, 34 fewer hours of sunshine per year (Met Office, 2012). Pollen counts, which can lead to sinusitis, tend to be higher in the South, resulting in higher rates of asthma related hospital admissions, as calculated for the years 1987-1994 (Newson et al., 1998).

Research into pollen in the past, or palynology, has resulted in a more focused understanding of regional differences in climate. For example, the difference in pollen from tree species can reveal

differences in the amount of woodland in a particular region (Evans and O'Connor, 2001, p. 64). When studied over longer time periods, pollen can also reveal changes to the local climate through the types of plants found in an area, by understanding their temperature thresholds as well as their water requirements (Evans and O'Conner, 2001, p. 70-1). However, most studies of this nature tend to explore the changing landscape of a single region over thousands of years (Evans and O'Connor, 2001, p. 135). Human presence in a region being studied also tends to mask the presence of pollens that could cast light on the species of plants or trees growing naturally in the area, as pollen from herbs or crops will overwhelm the natural pollen and bias the interpretation (*ibid.)*.

That being said, these man made depositions can also reveal a town or city's growth, as was done with Lübeck, Germany. It was found, though analysis of the pollen found within the town that, by the end of the 12th century, much of the town's food was imported rather than grown and that the cultivation of fruit and vegetables increased, most likely as a result of household gardens (van Haaster, 1994, p. 80). By the end of the fourteenth century the increase in nitrogen found in these garden sites indicates that the soil was exhausted and required the application of manure to increase yields ((van Haaster, 1994, p. 81). This coincides with a significant decrease in pollen associated with woodland, suggesting a reduction or possible elimination of the local woodland (van Haaster, 1994, p. 83). The town continued to grow, however, and by the fifteenth century most of these gardens had been moved to outside the town walls (*ibid.)*. This example shows the importance of environmental evidence in the reconstruction of subsistence practices and the town's economy.

Unfortunately, no similar research was carried out on the sites included in this study and therefore data regarding the environment in which people lived could not be accessed. That being said, similar moves from a local agricultural based economy to a more trade focused economy was happening all over Europe when these monastic institutions were functioning (Dyer, 2002, p. 212).

Medieval climate research is primarily focused on the differences in average temperature between medieval and modern periods. The first half of the period studied in this research was, on average, less variable than the latter half (Büntgen et al., 2011, p. 580). The 13th and 14th centuries were colder and wetter than the centuries both before and after due to the onset of the Little Ice Age, which began around 1300 (*ibid.)*.

When more specific, regional differences are discussed, these tend to be Europe-wide, rather than regional differences in England. Differences in climate have been suggested to be responsible for the perceived differences in the culture and outlook of people living in the north and south. As such, the question of whether these climactic differences, although slight, had any influence over the quality of life in the medieval period was always going to be a key question for this research,

especially given the fact that there are a number of documentary sources suggesting a difference in climate (see Section 5.2.2).

Work looking at tidal surges in coast areas and wetlands in London and its surrounds (Galloway, 2009) as well as data from the highlands of Scotland (Dodgshon, 2005) suggest that flooding may have been problematic for both the north and south of England, but that the increased storms coming in from the Atlantic Ocean would have also dropped the temperatures in the later half of the period we are discussing. If the mean annual temperature dropped by the same amount in the north and the south of England, the south would have been averaging closer to the north's original average and the north would have been further even below that. This drop in temperature, as well as the increase of flood risk, would have made life very difficult for people in medieval Europe and would have exacerbated any differences in the effect that the weather had on a particular region. Brandon's pioneering study of medieval weather as recorded in a variety of accounts, including those from monastic houses, suggests that some of these changes in weather had a significant effect on farming (1971). He also notes that any areas that had problems with soil composition or drainage in particular would have suffered from poor yields during years with high rainfall and lower temperatures (Brandon, 1971, p. 10).

While many of the houses included in this study would have been able to draw on a variety of resources to support themselves during these difficult years, the poorer houses and those with less land would have struggled. This could have had an effect on the nutrition of the inhabitants of these houses, while the colder and wetter weather may have also forced people indoors, potentially bringing their animals with them. This would have left people vulnerable to contagious bacterial and viral infections both from each other and from their animals. Even without the climatic variations towards the end of the later medieval period, areas prone to more rainfall and colder temperatures would have been limited in what crops they could grow and how long they spent indoors.

It is worth noting that, although the Northern houses are predominately urban, there was no indication that this caused a bias in the results. Figures 4.15 and 4.16, for example, show higher prevalence rates of Maxillary Sinusitis and NSI when compared to the Southern houses. Figures 4.25 and 4.26, however, shows Urban houses having lower prevalence rates when compared to Rural houses. If the one of the two groups were dominating the other, it would be expected that these results would be more similar.

5.3.1. Summary of results

(i) Southern houses

The southern houses in this study had a combined artefact assemblage with a high percentage of artefacts relating to horses and clothing. The dress accessory class was dominated by pins and other

clothing fasteners and gives no indication of either high or low status or income. The horse paraphernalia could indicate the ownership of horses for hunting, which would have been in violation of the Church's rules about monastic life (Knowles, 1959, p. 67, p. 74-5). Horses were also employed in a lot of agricultural work and in goods transport and therefore equipment relating to horses is not strictly indicative of high status or that the monks or nuns were disobeying the Church (Bond, 2004, p. 66-7; Clark, 2004; Langdon, 1982). The lower proportion of artefacts associated with crafts and industry, as well as reading and writing could also be the result of the more limited excavations into the precincts of three of the four southern sites.

There were also far more high status artefacts found at the southern houses, many of which were related to personal adornment, although there were also a large number of religious items. The southern houses, both in this cohort and the rest of the country, had higher suppression values than the northern houses. The average pensions (for this cohort only), however, were fairly similar. The people buried at the southern houses in this study also had higher prevalence rates of dental calculus (element-wise prevalence). This could have been the result of a high protein and/or sugar diet, typically associated with high status in the medieval period (DeWitte and Bekvalac, 2010; Hammond, 1995, p. 58-4; Harvey, 2002, p. 34; Dressler and Bindon, 1997, p. 56; Dyer, 1989, p. 58).

(ii) Northern houses

The northern houses, on the other hand, had higher prevalence rates of dental caries (element-wise), maxillary sinusitis (corrected), non-specific infection (element-wise and corrected) and trauma (element-wise and corrected). The high rates of dental caries could be a result of differences in fluoride levels in water and/or marine food access, or carbohydrate intake in a group's diet (DeWitte, 2010; Larsen, 1983). Considering the regional variations in access to seafood between different income levels and distance to the ocean, the high levels of dental caries could be attributed to a dietary difference in fluoride intake between the two populations (Malde et al., 2011; Bond, 2004, p. 183-210; Harvey, 2002, p. 46-51; Dabeka and McKenzie, 1995; Sibbison, 1990; Dyer, 1989, p. 154).

However, as discussed above (Section 5.2.1), there were two monasteries located within easy access of the coast, St James' Priory, Bristol and the Hull Austin Friars, and a further four houses located in major trading cities, St Andrew's Priory, York, Clementhorpe Priory, York, Nunnaminster, Winchester, and Hulton Abbey, Stoke-on-Trent, that would have had easier access to seafood than the other two, further inland sites, Elstow Abbey, Bedford and Sinningthwaite Priory, Bilton-in-Ainsty. As the balance of site location is fairly evenly split between the regions, it can be suggested that fluoride intake may not have played a large role in the prevention of dental caries in the southern monastic population of this study. As such, it may have been that the

northern houses were relying more heavily on carbohydrates in their diet than the southern houses, giving them a higher rate of dental caries.

The northern artefact assemblage reflects a population engaged in the activities prescribed for a monastic life, i.e. religious objects, agricultural and other kinds of tools, as well as artefacts associated with writing and reading. The high percentage of artefacts in the hygiene class is the result of the high number of combs associated with St Andrew's Priory, including many comb blanks and component parts, which could have been the site of some kind of production centre. This would not be unique, as many monasteries and nunneries engaged in various craft industries, for example, St Mary's Priory, a nunnery in Clerkenwell, London, was engaged in tile production and showed evidence of antler working (Sloane, 2012, p. 160-1).

The final artefact class that was found in a higher proportion in the north than the south was that of money, i.e. coins, which does not appear to correlate with the income differences seen between the two groups, as the southern houses were found to be substantially more wealthy than those in the north (or the midlands)

Poor environmental conditions, colder average temperatures, and/or a lack of general hygiene could have been responsible for the higher rates of maxillary sinusitis and non-specific infection among the northern population (Waugh and Grant, 2006; Slavin et al., 2005, p. 519-524; Playfair and Bancroft, 2004; Howe, 1997; Resnick and Niwayama, 1988, p. 4113-4). A higher level of physical activity, potentially evidenced by the higher proportion of artefacts relating to agricultural and industrial tools, combined with a potentially poorer diet could have resulted in the higher rate of trauma found in the northern population as well. This evidence, combined with the lower income and higher number of apostates, suggests that the inhabitants of northern monasteries and nunneries may have had a lower physical quality of life.

5.3.2 Contemporary views

Unlike the contemporary writings about monks and nuns, there were far fewer people writing social commentary with a regional focus in late medieval England. One of the most striking differences, as mentioned in the previous chapter, is the difference in wealth of the religious houses. Hopcroft notes that, even when the ecclesiastical data are removed, the south of England is still wealthier than the north as today (1994). She attributes this to a difference in the social organisation of labour, particularly in agriculture, which allowed farmers to be 'willing and able' to adopt new methods and technologies (Hopcroft, 1994, p. 1589). Part of this willingness to adopt new systems, she argues, stems from the 'individualist nature' of the southern regions (*ibid.)*. This difference in individualism is most strongly evidenced by the continuing use of common land in the North and Midlands (Hopcroft, 1994, p. 1576).

In Higden's historical chronicle, *Polychronicon*, the commentator John of Trevisa makes note of his 'wondur' of how many different accents there are in England (Trevisa 1869, p. 163). He describes the language used in Northumberland and York as 'so scharp, slyttyng and frotyng, and unschape, þat we Southeron men may þat longage unneþe undurstonde' (*ibid.)*. John of Trevisa goes on to suggest that the people who speak this way are different from those in the South and that the kings of England rightly avoided these areas, due to their lack of sophistication, suggesting that while men of the South are mild, men of the North are more unstable and cruel (*ibid.)*.

Slightly later than the period covered in this research, but still relevant are the comments made by Toby Matthew on his journey from Oxford to Durham in 1583. Following a night in an inn in Northallerton (North Yorkshire), he writes that every rumour he had heard about the North was true, and that three days spent in prison would be preferable to three days spent in the North (Newton, 2007, p. 49-50). Toby Matthew later played host to Lady Arabella Stuart after she was 'banished' in her words to the North following her resistance to a marriage. She wrote that she did not want to be sent to the 'remote parts' of the country to be tried for an offence in courts she deemed unfit (Newton, 2007, p. 50). For a woman brought up in the North Midlands, this suggests that the opinion of the North as a primitive place was not confined to London (*ibid.)*. In short, it was not an uncommon view in southern England that the North was a primitive and unsophisticated place.

5.3.3 Results in light of contemporary views

The handful of contemporary writings regarding regionalism in medieval England suggests that people had strong ties to their local regions as well as less than favourable opinions about other regions (Newton, 2007, p. 49-50; John of Trevisa 1869, p. 88), like today. By and large, the south was considered wealthier and, depending on an individual's location, more culturally refined or unaccustomed to harsh living conditions, either climatic or income related (*ibid.)*. The north was thought of as wilder, poorer and, by some, socio-culturally primitive (*ibid.)*.

The southern houses included in this research, as well as those in the rest of the country, were found to be significantly wealthier than their northern counterparts. In addition to this, the pensions granted to the individuals from the southern houses were greater. There were more high status artefacts found associated with the southern houses and higher dental calculus rates, which are possibly suggestive of a high status high protein diet. The higher rates, however, could also be the result of a higher level of hygiene at the northern houses in the form of oral hygiene (Hyson, 2003; Fischmann, 1997).

Within the northern houses there was a higher proportion of artefacts relating to physical labour, through agriculture and craft production, as well as writing/reading. There were also significantly more religious artefacts associated with northern houses, possibly suggesting that northern houses were more likely to live in stricter adherence to the Benedictine Rule. However, this could also be a result of a difference in which areas were excavated and how extensive the excavations were at the different sites. Three of the four southern houses (i.e. not Elstow Abbey) had relatively small excavations, while the three northern houses (excepting Sinningthwaite Priory) all had more extensive excavations. This could have influenced the lack of diversity in the artefacts associated with the southern sites.

The health indicators found in significantly higher proportions at the northern houses, including dental caries, maxillary sinusitis and non-specific infection, suggest poor living conditions and diet, as well as a higher risk of trauma.

The potential difference between the two is highlighted by the higher prevalence of dental calculus in the population associated with the southern houses, which could be indicative of a high status diet if it was caused by a diet rich in protein. The Benedictine Rule, as discussed above, forbade the consumption of meat (Benedict, 1990, p. 62). However, it was not an uncommon complaint of religious houses, both by visiting bishops and critics, that the monks and nuns found loopholes in the dietary guidelines and that many houses ate better than the gentry (Knowles, 1959, p. 62-86; Knowles, 1955, p. 204-218; Knowles, 1948, p. 85-96; Anonymous, 1968, p. 60-62).

The differences in prevalence rates of dental calculus among the inhabitants of the southern houses could, instead of being an indication of status or wealth, be an indication of the accessibility of different types of food at these sites in comparison to the northern houses. Albarella and Thomas note that, in their research of the prevalence of bird bones at archaeological sites, there was a distinct difference in the species of birds commonly found on medieval sites in the north and south of England. They conclude that:

> ‘Overall therefore, it appears that the distribution of birds in medieval England was strongly affected by geographic and environmental factors. Although this is not surprising, it is still worthy of note that in a period in which trade must have played a significant role in the distribution of foodstuffs, regional differences can still be identified. These are likely to have been determined by a combination of environmental and cultural factors.’ (Albarella and Thomas, 2002, p. 33)

It is striking that the southern houses included in this research have higher rates of dental calculus as well as higher Dissolution values and higher pensions, suggesting that, on average, they were wealthier than their northern counterparts. From this evidence, it could be suggested that these houses had access to higher status and more expensive food.

5.3.4 Quality of life at northern and southern religious houses

As with the previous section, this section will firstly explore the evidence for physical quality of life within the southern and northern religious houses, which will be followed by a discussion of the spiritual quality of life within these institutions.

(i) Physical quality of life

The physical quality of life experienced by the individuals at the southern religious houses, from the evidence available, appears to have been reasonably high in comparison to those living at northern houses. The only health indicator found in a significantly higher prevalence in these houses was dental calculus, a potential indicator of high status diet. The lack of other health indicators could be an indication of a population with either very good health, very poor health, or a mixture of the two (Wood et al., 1992). As mentioned above, this is a problem for the entire field of bioarchaeology and there is no way of knowing the reality of the situation.

No artefact classes were found in higher proportions that suggested either a difficult or a particularly hard working lifestyle, although this could be the result of the differences in the size of the excavations. In addition to this, the gross dissolution value, both at the houses included in this study and all those recorded in the *Monasticon*, was higher at southern houses than northern, as were the average pensions. These combined factors suggest a life with little hardship and reasonable comfort, suggesting a good quality of life. The northern religious houses, on the other hand, have a variety of artefacts relating to physical work as well as religious items, and people buried there have several health indicators found at a significantly higher prevalence that indicate a poor living environment and a higher risk for experiencing trauma and infection. Poor environmental conditions that feature high particulate levels in the air can lead to the development of, or irritate ongoing, maxillary sinusitis (Waugh and Grant, 2006; Slavin et al., 2005, S19-29; Evans, 1994). A lack of hygiene and hygienic living conditions, similarly, can influence the development of, or hinder, the healing of infection, allowing it to go on long enough to be detected archaeologically (Waugh and Grant, 2006; Playfair and Bancroft, 2004; Apley and Solomon, 2000; Resnick and Niwayama, 1988, p. 4113-4).

As has been discussed previously, people living in different parts of England would have relied on different staple foods, e.g. cereals, and would have had to cope with different climatic and environmental challenges. For example, Gowland and Western (2012) found that people living in the marshy regions of Anglo-Saxon England may have been at higher risk for contracting malaria, if cribra orbitalia is in fact linked to malaria, than those living at higher elevation. Dyer notes that following the Black Death, the economic ramifications of the population decrease resulted in differences in peasant holding sizes in different regions (1989, p. 124-5). Similarly, different regions had different practices and suitability regarding animal husbandry. Areas where herd

animals thrived also had access to the manure, which substantially increased the yields of the harvest (Dyer, 1989, p. 125-30). Dyer concludes that 'much of lowland England, including areas now regarded as sheep country…the peasant flocks and herd were insufficient to contribute fully to the fertility of the arable' (1989, p. 130). Although not directly analogous to the differences between northern and southern religious houses, it is clear that regional and environmental differences affected all levels of society.

As with the nunneries versus monasteries, this could indicate that the individuals at the northern sites were healthy enough to survive a poor living environment long enough to develop the bony reaction in maxillary sinusitis. The southern sites could have had a poor living environment as well, but lacked the health to survive long enough to develop the bony evidence of maxillary sinusitis, as per the hypothesis of Wood et al. (1992). This is unknowable, but there is evidence for the possibility of poor conditions at the northern sites and that these houses were, on average, poorer than their southern counterparts, which may or may not have played a role in the living conditions. It is, therefore, suggested that northern houses had a lower physical quality of life than southern houses.

(ii) Spiritual quality of life

In comparison to each other, the northern religious houses had a potentially higher spiritual quality of life than the southern houses, as suggested by the health indicators associated with poor living conditions as well as higher proportions of religious artefacts at the northern houses, although the limited excavations at the southern sites may have played a part in this result. In both regions, however, there is the suggestion that the dietary aspects of the Benedictine Rule were not being strictly followed, as evidenced by the high rates of dental caries at the northern houses and dental calculus at the southern houses.

Concluding this section, it is emphasised that, while physical quality of life appears to have been better at southern religious houses, the spiritual quality of life appears, potentially at least, to have been better at the northern houses.

5.4 Urban and Rural Houses

Modern studies have found that rural communities are more likely to have poor access to health care, as well as lower income, education, and information technology use then their urban or suburban counterparts (Hartley, 2004, p. 1675-6). This correlates with a population that smokes more, exercises less, has less nutritionally well balanced diets and are more likely to be obese (Shucksmith et al., 2009, p. 1286-8; Hartley, 2004, p. 1676). Rural communities in poorer countries in Europe are also more likely to have high unemployment and suffer from the 'consequent deprivation' of that unemployment (Shucksmith et al., 2009, p. 1288). In addition to this, when

people have work, they tend to work in industrial, blue-collar jobs (*ibid.)*. It has been similarly argued that the lives of people living in cities were vastly different from those living in rural areas in the late medieval period (Hammond, 1995, p. 40-44; Dyer, 1989, p. 196).

The suggestion is that the people living in cities were able to, in some sense, depend on their local government to ensure that they were fed, and that rural people were more susceptible to seasonal deficiencies (Davies, 2004; Dyer, 1998, p. 60; Dyer, 1989, p. 160). Although the rural areas provided a great deal of the food for the urban communities, and harvest failures may have affected urban food sources those individuals living in cities also had greater access to international trade (Dyer, 1998, p. 60; Dyer, 1989, p. 160). Urban governments were also careful to stockpile grains and other foods that could be stored in case of famine or shortages, on a scale that was not always possible in rural communities. Urban governments also legislated food prices in order to ensure that all levels of society had access to the staple goods (Davies, 2004).

The larger rural monasteries and nunneries may have been shielded from these seasonal ups and downs due to their extensive land holdings which allowed for the storage of a percentage of the surplus, but smaller communities would have been at risk due to their inability to store as much food and other supplies as with other small holders (Bond, 2004, p. 25). Even if both a small and a large house stored a similar percentage of their surplus, the house with the larger, overall surplus would be better prepared for future shortfalls. Similarly, larger urban monasteries and nunneries would have had the capacity to trade or import the items necessary for supporting their standard of living, either from their rural holdings or through purchase. Smaller urban communities would, on the other hand, be unable to draw on such large resources, but would have still been able to access the urban markets (Dyer, 1989). In addition to their ability to export their produce to towns and cities, rural monasteries and nunneries often had a large lay population associated with them and were therefore not as isolated as the name suggests (Bond, 2004, p. 240).

The question, therefore, concerns what whether being more closely tied to the land or being supported by a market-based system make for a better quality of life. Similarly, did the isolation provided, in theory, by a rural setting ensure a closer following of the monastic ideal. By analysing the artefact assemblages, prevalence rates for health indicators and income of the eight sites studied any differences in quality of life between the monastic institutions in rural and urban locations may be explored.

5.4.1. Summary of results

(i) Urban houses

The artefact assemblages of the urban sites had higher percentages of those items that suggest the inhabitants were adhering to the monastic ideal, i.e. religious paraphernalia, and agricultural and

other kinds of tools (including evidence of comb production at St Andrew's Priory), as well as artefacts associated with reading and writing. This agrees with Gilchrist's (2012, p. 147) assertion that literacy rates were higher overall in towns and cites. However, there were also high percentages of jewellery found at the sites, as well as a handful of artefacts associated with gaming or gambling. There were no health indicators that occurred at a higher prevalence within the urban populations. The urban sites also had lower average suppression values and a lower average pension, but slightly more apostates than the rural houses.

(ii) Rural houses

The rural artefact assemblage contained higher percentages of dress accessories, horse related artefacts and household items. The household and dress accessories do not suggest either a particular vice or a beneficial behaviour. The artefacts relating to horses could indicate a disregard for the rules against monasteries (or nunneries) keeping horses for hunting or a reflection of the higher numbers of draft animals in rural locations (Bond, 2004, p. 66-7; Langdon, 1982; Knowles, 1959, p. 67, p. 74-5). That being said, horses were also required for transport for messengers and representatives, for agricultural work, as well as some of the social functions of the elite, which included abbots/abbesses and priors/prioresses. As such, the present of artefacts relating to horses do not automatically confer higher status on the rural houses.

The rural skeletal populations had high rates (in relation to the urban population) of dental calculus and caries (element-wise and corrected prevalence rates). There were also high prevalence rates of maxillary sinusitis (corrected), non-specific infection (corrected) and osteoarthritis (element-wise). When taken in conjunction, these health indicators could suggest a high protein and sugar diet, which would be more indicative of a high status way of life, but also poorer air quality, including the higher levels of pollen and grain dust (Roberts, 2007, p. 792), and living conditions in these rural sites.

5.4.2 Contemporary views

The differences in urban and rural religious houses related strongly to the ideology of the orders (see Section 5.4.2). However, the differences between urban and rural life would likely have had an impact on the lives of the inhabitants, and there is evidence of complaints about the dangers of urban living, both in terms of crime and pollution. A national statute in 1385 concluded that:

> 'So much dung and filth of garbage, as well as entrails of slaughtered beasts, and other corruptions are cast and put into ditches, rivers and other waters and also in many other places within and around cities, boroughs, and towns of the realm and their suburbs, that the air there is greatly corrupt and infected, and many maladies and other intolerable diseases do daily happen to the inhabitants…' (Anonymous, 2006).

In addition to pollution, crime was a significant problem in urban centres. Several studies have concluded that, while homicide and other crimes were not unknown in rural settings (Hanawalt,

1979), they were more common in cities (Eisner, 2003, p. 100; Given, 1977). For example, King Edward II wrote to the mayor and sheriffs of London in 1310 to voice his concern about the crime levels in the city and to admonish them for their lack of policing. According to the letter 'many robberies, murders, and other trespasses are perpetrated, maintained, and iniquitously upheld by procurers and procuresses [and] common bawds in inns and other places in our city…' (Edward II, 2006).

There were also those, however, who idolised urban living. William FitzStephen, at the beginning of his biography of Thomas Beckett, wrote about the greatness of London, numbering it 'among the noble cities of the world' and that 'the citizens of London are regarded as conspicuous and noteworthy for handsomeness of manners and of dress, at table and in way of speaking,' including that they are more commendable in their church attendance than any other populace (FitzStephen, 2006). He does write, however, that the only problems in London are 'immoderate drinking of fools and the frequency of fires' (*ibid.)*.

Far from the idealised city of FitzStephen, urban centres often found themselves in dispute with individuals (or institutions) who lived in the suburban or rural areas in the vicinity (Attreed, 2002). These cases often resulted from disputes about whether these suburban or rural settlements should be included in urban taxes or regulations (*ibid.)*. The Peasants' Revolt of 1381, which largely took place in the south of England, highlighted the regulations under which rural farmers bringing goods to market in urban centres were forced to practice, including the payment of tolls and the struggle against large trade organisations that held a monopoly (Galloway, 2001, p. 117). Overall, the move from an agricultural-based economy to a market-based economy was a significant change during the medieval period, which required a shift in the relationship between urban and rural (Glennie, 2001, p. 138).

At the beginning of the period covered by this research, the ideal behind the rural monastery (or nunnery) was that of a community of religious people living an almost eremitical lifestyle, devoted to both prayer and labour in the name of God (Knowles, 1976, p. 216). As these rural monasteries (and nunneries) became wealthier, the view of urban monasteries and friaries (and nunneries) as places of greed and power extended to include the rural houses. Gerald of Wales wrote that the Cistercians in particular were so anxious to collect 'rich lands and broad pastures' (Giraldus, 1978, p. 103) that he worried their greed would overcome their desire for a 'barren retreat which is hidden away in an overgrown forest' (Giraldus, 1978, p. 106) and would lead to their corruption.

5.4.3 Results in light of contemporary views

The artefact classes found in high proportions at the urban sites include those associated with religious devotion and physical labour, possibly signifying strict observance of these aspects of the

Benedictine Rule. The weapons found at these sites were primarily associated with St Andrew's Priory, York and were found in the earliest strata associated with the monastery, and they are therefore difficult to link to the monks directly, although they could have easily been donated to the monastery as part of a knightly burial ceremony. However, artefacts associated with gambling or gaming were also found in high proportions at urban houses, as were items of jewellery. These items could suggest a particular set of urban vices, specifically gambling and personal adornment that were forbidden by the Benedictine Rule. In short, those artefacts associated with both diligence and indulgence were found in high proportions at the urban religious houses.

The rural houses, in terms of vices, had no artefact classes in high proportions that would indicate specific vices. However, both dental caries and calculus were found in high prevalence among individuals at rural sites, and these could be indicative of a high status diet, i.e. high protein and sugars, as has been discussed above (DeWitte and Bekvalac, 2010; Hammond, 1995, p. 58-4; Harvey, 2002, p. 34; Dressler and Bindon, 1997, p. 56; Dyer, 1989, p. 58). This is not unexpected, considering that the dissolution values and pensions were higher at the rural houses.

In addition to high prevalence rates for these two health indicators, there were also higher corrected prevalence rates of both maxillary sinusitis and non-specific infection, as well as a high element-wise prevalence of osteoarthritis. As has been discussed above, both maxillary sinusitis and non-specific infection could be indicative of a poor living environment (Waugh and Grant, 2006; Slavin et al., 2005, p. 519-524; Playfair and Bancroft, 2004; Howe, 1997; Resnick and Niwayama, 1988, p. 4113-4), while osteoarthritis could be indicative of obesity, age and/or physical labour, although it is a disease with such a complex aetiology that it is difficult to interpret the data with any certainty (Weiss and Jurmain, 2007, p. 438; Pottie et al., 2006; Seedhom, 2006; Hunter et al., 2005; Cooper et al., 1998).

Considering the contemporary evidence that medieval urban spaces could be extremely unhygienic, high rates of both maxillary sinusitis and non-specific infection would be expected at these sites (Roberts, 2007; Waugh and Grant, 2006; Slavin et al., 2005; Playfair and Bancroft, 2004; Merrett and Pfeiffer, 2000; Howe, 1997; Panhuysen et al., 1997; Resnick and Niwayama, 1988, p. 4113-4). In addition to this, many rural houses encouraged the view that their inhabitants were living a more diligent lifestyle and, as such, higher proportions of tools and industrial equipment would be expected at these sites (Knowles, 1976, p. 216; *Journey*, 103-106). In summary, these data do not match with the contemporary views of these two types of religious house.

5.4.4 Quality of life at urban and rural houses

This section will first discuss the implications these results have on the understanding of the physical quality of life experienced at the urban and rural religious houses, which will be followed by a discussion of those same results in terms of spiritual quality of life.

(i) Physical quality of life

In terms of physical quality of life, there is little evidence to suggest that the urban religious houses either suffered from a poor quality of life or prospered from a good quality of life. No health indicators were found at a significantly higher prevalence, in comparison to the rural religious houses, to suggest either poor living conditions or an indulgent lifestyle. This could, of course, be evidence not of good health, but of a population in such poor health that they were unable to fight off any infection, or a combination of the two (Wood et al., 1992). The documentary evidence of poor environmental conditions in urban medieval spaces could have resulted in high infection rates among the monastic population (Waugh and Grant, 2006; Playfair and Bancroft, 2004; Apley and Solomon, 2000; Harvey, 2002, p. 135; Resnick and Niwayama, 1988, p. 4113-4).

A survey of medieval Winchester published in the 1980s suggested that the areas of muddy soil littered with animals bones uncovered in archaeological excavations of medieval streets is evidence of the potential filth to be found in medieval cities (Keene, 1985, p. 53). However, Jørgensen (2008, p. 560) counters that these archaeological remains could also be the result of using waste as filler material when leveling an area or even paving streets. However, the practice of throwing butchery waste into the river was well known in both medieval Winchester and York (Jørgensen, 2010, p. 42; Keene, 1983)

In an effort to keep the river running smoothly and cleanly, York city officials made it illegal to through any household waste or manure into the River Ouse (Jørgensen, 2010, p. 38). However, York as a city appears to have struggled in the medieval period with people throwing waste resulting from various crafts, including butchery, leather making, and cloth dying (Jørgensen, 2010, p. 38-9). The friary within the city had even complained to King Edward III about the level of river pollution to which he responded with a sharp warning to the city to, essentially, keep the butchers and other craftsmen from throwing waste into the river. He also imposed a fine of 100s on any butcher caught disposing of waste within, 200 feet of the friary (Jørgensen, 2010, p. 41). The problem was not over, however, and the Friars complained to the King again three years later (*ibid.)*.

In fact, the problem appears to have continued throughout the medieval period and eventually became a problem of navigation. The River Ouse had become so polluted that city officials feared that the river would become un-navigable, killing trade in the city (Jørgensen, 2010, p. 42). This was not simply a result of butchery and other crafts' waste, however, the city drains and gutters

eventually fed into the rivers (Jørgensen, 2010, p. 42-3). In the 1500s, there were a series of efforts to physically clean out the river to ensure that it remained clear of pollutants (*ibid.)*. Jørgensen interprets these efforts at regulation and legislation as the city taking an active interest in the pollutant levels in the river (Jørgensen, 2010, p. 43).

However, the fact that none of the regulation and legislation appears to have succeed, there is the additional conclusion that anyone living and working near the river could have been exposed to the byproducts of butchery, including blood and animal organs, tanning, which used urine to soften the hides, and cloth dying, a process which used lye to fix the colours (Gimpel, 1976, p. 85-6). Additionally, although people primarily drank ale, beer, or wine rather than water, any drink made within the city probably used contaminated water, which may have contained a fairly high pathogen load (Jørgensen, 2008; Hammond, 2005, p. 88; Hudson-Edwards and Macklin, 1999; Dyer, 1989, p. 191).

Harvey hypothesised the high death rates among the younger members of the population of her study of Westminster Abbey was the result of individuals from a rural background being unable to cope with the high pathogen levels within a crowded city (Harvey, 2002, p. 130-135). Similarly, Simon Mays (2007, p. 191) found that both porotic hyperostosis and periostitis were more frequent in the York St Helen-on-the-Walls population than it was in the rural Wharram Percy population. He also attributed this to the higher pathogen load in urban environments (*ibid.,* Roberts, 2007, p. 794).

Two artefact classes at the urban sites suggest that individuals within the walls of these religious houses found time for playing games and had funds to indulge in some personal adornment. According to Goldberg's (2008) study of medieval domestic goods, rural households were more likely to have 'outside' goods or cooking utensils associated with them, while urban households were more likely to invest in items associated with comfort, i.e. bed furnishings and cushions. However, there is also evidence that writing/reading, other physical labour and religious devotion was on going. As such, it can be suggested that those living in urban religious houses had a good quality of life, in that there is no skeletal evidence for either a poor or luxurious living environment. There is also artefactual evidence that there was some extra money and time at their disposal as well as a skill set (i.e. reading and writing) that was expected of their social standing.

The ability to read and write may have been directly influenced by the setting of these religious houses as, according to Gilchrist (2012, p. 147), literacy rates were higher in towns and cities when compared to more rural communities. This is partially due to the access young boys and girls would have had to education from the grammar schools run by cathedrals and other religious institutions, including monasteries and nunneries, but also helped by the fact that many urban

children were taught simple reading and writing by their parents (*ibid.)*. The abbey of Nunnaminster, for example, is known to have run a school for the daughters of lords, knights, and gentlemen (Power, 1922, p. 266). Other nunneries, however, also provided education for boys as well as girls, although the boys often left to become wards of other noble families, even being admitted to the household of an abbot (Power, 1922, p. 266-7). The practice of schooling children, especially for urban houses, may have helped to ensure that at least a portion of the religious men and women were able to read and write.

The rural houses, on the other hand, have skeletal evidence for both poor living conditions and high status diets (or poor oral hygiene), in the form of maxillary sinusitis, non-specific infection, and dental calculus and caries. These houses also had a higher average Dissolution value and the monks and nuns were granted slightly higher pensions after the Dissolution than their urban counterparts. In conclusion, it can be reasoned that the inhabitants of rural religious houses could also expect a good quality of life, in relation to what could be expected at any religious house. They might have had poorer living conditions and possibly poorer oral hygiene, but their possible access to a high status diet and a higher level of income helps to balance this out. In short, the expected quality of life at urban and rural houses was fairly comparable, although the risks and benefits were different at the two types of houses, with the exception of the possible poor living conditions at both.

(ii) Spiritual quality of life

A good spiritual quality of life in medieval England, according to the Church, was one maintained by what the modern, western world might call a poor physical quality of life, meaning that self-denial and mortification of the flesh was thought to improve one's soul (see Section 2.3.3). Whether the spiritual value of the self-denial was diminished if it was the person's choice to experience it, i.e. through poverty or genuine religious devotion, is not clear. The urban houses studied show little sign archaeologically of their inhabitants living a life of denial and discomfort. However, there is also little indication of lives spent in total indulgence. There are artefacts associated with religious devotion, physical labour and some vices. The result is one of a good physical quality of life and an average spiritual quality of life, one that is neither exceedingly pious nor decadent.

Similarly, the rural houses studied were found to have a good physical quality of life, given their high monetary value, high status diet but poor living conditions. The only conclusion that can be made about their spiritual quality of life, therefore, is that it was also average. There are elements of an indulgent life (i.e. diet and income) but also of physical sacrifices (i.e. poor living conditions).

Concluding this section, therefore, there was little difference in the overall physical and spiritual quality of life to be expected at urban and rural religious houses. The difference lay rather in which elements of "life" an individual was interested in indulging or surrendering.

5.5 Older and Reform Orders

Some time in the 6th century AD, Benedict of Nursia, founded a religious community for the purpose of isolating a group of religious people from the rest of society so they could better focus on God (Lawrence, 1989, p. 19-39. Similarly, in the late 4th century AD Augustine of Hippo wrote a set of rules for those who wanted to live in a religious community (Lawrence, 1989, p. 165). Both suggested that, in order to do this, the lives of the men within the community should be strictly regulated, both in activity and diet. Hundreds of monasteries following their teachings were founded over the next thousand years.

By the eleventh century, many believed by many that monasteries (and nunneries) had fallen away from the Benedictine way of life (Lawrence, 1989, p. 174-6). Starting in the 12th century, a variety of new monastic orders were founded on the belief that the entire system needed reform. They brought forward the idea that the lives of the inhabitants of religious communities should follow the strict regime set out in the original Benedictine (and Augustinian) Rule (*ibid.)*. By the end of the medieval period, however, many felt that the reform orders had also drifted from the Rule and were now just as decadent and sinful as the older orders had become (Lawrence, 1989, p. 286-88). As such, this research set out to assess whether these two general types of orders, older and reform, actually had any impact on the quality of life experienced by their inhabitants.

5.5.1. Summary of results

(i) Older orders

From the eight sites studied, those from the older orders had higher percentages of dress accessories, horse paraphernalia and household artefacts than those from the reform orders. The high percentage of dress accessories could be associated with personal adornment but, as the majority of artefacts are either pins or other clothing fasteners, this is unlikely. The high percentage of horse paraphernalia, however, could be evidence of the ownership of horses, which would have been an expensive endeavour, although not completely out of reach for a farmer or skilled labourer (Langdon, 1982). The keeping of horses would have been a necessary expense, however, for transport and some of the social functions of the monastic superiors. The high status artefacts associated with the older order sites were, in the majority, jewellery.

There were also higher element-wise prevalence rates of dental calculus and DISH. Both of these health indicators have been linked to high protein diets, although both have a far more complicated aetiology than simply high protein diets (Castilhos et al., 2012; Spencer, 2008; Van der Velden et

al., 2006; Jankauskas, 2003; Kiss et al., 2002; Rogers and Waldron, 2001, p. 361; Lieverse, 1999). This would suggest that the individuals with a high protein diet were not following the vegetarian diet prescribed by the Benedictine Rule. It could also suggest that the individuals at the older order sites had poorer oral hygiene although, in combination with the higher prevalence rates of DISH, the possibility of a high protein diet are not inconceivable. The average suppression value of the older orders was also higher than the reform orders, both within this collection of houses and all those recorded in the *Monasticon Anglicanum*. However, the average pension granted to the individuals tied to the houses in this research was roughly equal, there were fewer apostates at the houses belonging to the older orders.

(ii) Reform orders

The reform orders in this study were found to have high percentages of objects relating to hygiene, primarily combs. The vast majority of these combs came from the excavation of St Andrew's Priory, York and appear to resemble a manufacturing centre rather than a group of men particularly obsessed with combs; this is because there were complete combs, comb blanks and a variety of different component parts of combs. These sites also yielded a high percentage of religious paraphernalia, agricultural and craft tools, and objects relating to reading and writing. This combination of artefacts suggests a population adhering to the Benedictine Rule by engaging in some form of manual labour, reading and copying important texts and religious worship (Benedict, 1990, p. 69-70). The majority of the high status artefacts associated with the reform order sites were religious in nature.

The health indicators with higher prevalence rates at the reform houses included in this study suggest a potentially poor living environment and a high risk of injury. Maxillary sinusitis (corrected) and non-specific infection (both corrected and element-wise) rates were higher at the reform order houses. Both of these conditions have been link to poor living conditions, and specifically poor air quality and unhygienic conditions (Roberts, 2007; Waugh and Grant, 2006; Slavin et al., 2005; Playfair and Bancroft, 2004; Merrett and Pfeiffer, 2000; Howe, 1997; Panhuysen et al., 1997; Resnick and Niwayama, 1988, p. 4113-4). There were also high rates (both corrected and element-wise) of trauma in the populations of the reform orders.

5.5.2 Contemporary views

The reform order most commonly discussed is that of the Cistercians, who were largely a rural order (Knowles, 1976, p. 215; Knowles, 1948, p. 64-77). However, many reform orders, specifically the mendicant orders, were by and large urban (Knowles, 1948, p. 114-126). As the houses belonging to the reform orders in this research are evenly split between urban and rural, as are those belonging to the older orders, this distinction is important. It is also important because the

difference in ideologies of the different orders could vary so much as to have an effect on the quality of life of the inhabitants.

The reform orders, by and large, wanted to portray themselves as leading a more ascetic lifestyle. The Cistercians followed the central tenet that by (theoretically) isolating themselves and committing to a life of physical labour, they were more closely following the Benedictine Rule of self-sacrifice and penance alongside prayer (Lawrence, 1989, p. 174- 192; Knowles, 1976, p. 215-6). The mendicant orders believed that by wandering, preaching and living a life of extreme poverty they more closely followed the life of Jesus, which was, therefore, a more holy life (Knowles, 1948, p. 124-125). However, by the end of the Middle Ages, many of the reform orders were being accused of the same kinds of transgressions as the older orders.

Gerald of Wales wrote that '[The Benedictine Order] In its original state…was wholly admirable…but later on the order accumulated vast wealth…with the result that…under cover of a most regrettable dispensation, gluttony and indulgence ended in corruption. The Cistercian order…clung tenaciously to its original vows of poverty and holiness…[and it is] much to be praised and commended' (Giraldus, 1978, p. 101). Although he does note that the ambition of the Cistercians should be watched in case it leads them to ruin (ibid.). He also wrote that the Cistercian monks he encountered offered 'limitless charity to pilgrims and the needy…[and that they live] on the sweat of their brows' (Giraldus, 1978, p. 103).

The older orders, both at the beginning and end of the period, were accused of being too wealthy, greedy and lustful (Banks, 1904; Press, 1971; Chaucer 1894; Boccaccio, 2008; Lindsay, 1989), but the reform orders, especially the mendicant orders, came under fire by the end of the period for being equally wealthy, greedy and lustful (Langland, 2008; Lindsay, 1989).

Cistercians were often accused of destroying villages to make way for their granges, a land management strategy that is often credited to their huge financial success, and as evidence of their greedy ways (Bond, 2004, p. 246-9; Paris 51, p. 187, p. 213-4). The mendicant orders (i.e. friars), possibly the most vilified of the reform orders, were charged with cheating people out of their money, food and good will in direct opposition to their vows of poverty (Boccaccio, 2008; Anonymous, 1968; Langland, 2008; Lindsay, 1989). In fact, friars were the first and last target of many of the Lollards, a group of people set upon bringing in reform to what they saw as a flawed organisation in the Church (Paris, 1982; Langland, 2008; Lindsay, 1989).

5.5.3 Results in light of contemporary views

The high prevalence rates of dental calculus and DISH found in the skeletal population from the older order houses suggest that the contemporary views of the Benedictine order as having a high

status lifestyle was not entirely unfounded. In addition to this, the gross Dissolution value was also higher (in both the houses studied, and in those found in the *Monasticon*) in the older order houses, although the pensions were slightly lower. The contemporary view of the reform orders, as discussed above, changes significantly over the course of the period in question. The data from the houses studied in this research support the earlier view of the reform orders leading a stricter life and being more diligent in their work. In addition to their Dissolution value being lower than the older order houses, there were higher prevalence rates of maxillary sinusitis, non-specific infection and trauma. This matches the early contemporary views that life was harder and that the Rule was more diligently observed in the reform orders.

5.4.4 Quality of life at older and reform order houses

As in the previous sections the question of physical quality of life will first be discussed, followed by a discussion of spiritual quality of life in the older and reform orders.

(i) Physical quality of life

The older orders, with their higher Dissolution value and high status diet (as evidenced by higher rates of dental calculus and DISH), can be suggested to have had a higher physical quality of life than the reform orders. Rogers and Waldron found, both in their original observation at Merton Priory and in their later comparison between Wells Cathedral and the Royal Mint site, that DISH was seen more frequently in monastic populations compared to the lay population (Rogers and Waldron, 2001, p. 360-1; Waldron, 1985). Interestingly, Merton Priory was an Augustinian house, one of the older orders, and was situated in Surrey (Waldron, 1985, p. 1762). Waldron goes on to suggest that there may have been something about the lifestyle within monastic houses that predisposed people to developing DISH (1985). Spencer's (2008) PhD thesis found that monastic populations did have higher than average prevalence rates of DISH, but that high status diet cannot be considered the only factor. In her review of the clinical literature she outlines a number of factors, including poor insulin retention and chronic lack of sleep, which may have been exacerbated by a combination of a high status diet and the monastic daily routine (Spencer, 2008).

However, were these factors exclusive to monasteries, it would have been expected that the prevalence rates would have been significantly different between monasteries and nunneries. Instead, the only populations between which there is a statistically significant difference in the prevalence rates of DISH are the older and reform orders. It is possible that this points to a behavioural difference between the two types of orders, potentially suggesting that the older orders had the added high status or at least high protein diet that may have provided the missing ingredient to the development of DISH. There were also more high status artefacts, specifically jewellery, found at the older order houses. Overall, the evidence suggests that the older order houses had

access to more wealth and "advertised" their said wealth, both in their diet and, to a lesser extent, their personal adornment.

The health indicators in the skeletal population of the reform orders suggest a potentially poor living environment, as well as high risk of trauma. The poor living environment could also have been a possibility for the older orders, but if they population was in poorer health, most would have died before any evidence of these conditions became evident on the bones (Wood et al., 1992). The artefactual evidence suggests a group of individuals maintaining the lifestyle dictated by the Benedictine Rule. The gross Dissolution value was also lower than the older orders, although the pensions granted were similar. This suggests that the older orders may have had a higher physical quality of life than the reform orders.

(ii) Spiritual quality of life

The high proportion of agricultural and craft tools, reading and writing implements, and religious artefacts suggest that the individuals at the reform order houses were involved in tasks approved for monks and nuns by the Benedictine (and other) Rule. In addition to this, the high prevalence rates of maxillary sinusitis and non-specific infection, and to a lesser extant trauma, suggest that the environment at these houses was less than optimal. The high prevalence rates of trauma could be associated with dangerous or strenuous work or activities and/or with a life filled with misfortune. When taken in association with the lower Dissolution value, the evidence suggests that the individuals associated with the reform order houses had a higher spiritual quality of life than the older orders, in terms of the medieval idea of penitential living as a way of purifying the soul.

5.6 Quality of Life

As discussed above, the goals of this research were as follows:

- To consider the validity or suitability of the phrase "quality of life" (QoL) when studying the lives of archaeological populations
- To explore the differences, if any, between the quality of life of the inhabitants of different monastic groups according to gender (nunneries and monasteries).
- To detect any inequality in the QoL between northern and southern houses, urban and rural sites and between orders (older and reform orders).

The first question was introduced in the literature review (Chapter 2), and will be reviewed below, followed by a discussion of the second and third questions exploring the potentially differing quality of life in medieval monastic houses according to the sex of the inhabitants, their geographic regions and urban or rural contexts, and whether they were older or reform orders. The following sections will address these goals and assess how successful this research was in achieving them.

5.5.1 Use of the term quality of life

In order to understand the term "quality of life" and the way it could be explored in archaeology, as per the first goal of this research project, the way the phrase is used in a variety of modern organisations was explored. International aid organisations, including the UN and the WHO, use the phrase to report on the progress of entire countries in terms of GDP, medical care and education (among many other criteria) in order to assess their need for aid and identify areas requiring attention (WHO, 2010; HDR, 2007/8; HDR, 1990). National and local governments also use the phrase quality of life in their assessments of what areas require assistance and/or additional funding (ONS, 2012; Audit Commission, 2002). A recent national census in the UK included questions about people's quality of life to assess what areas people felt needed the most improvement in order to ensure that government resources could be allocated accordingly (ONS, 2012). Local councils in the UK have also carried out research on their communities to assess what areas the local people feel are important and what areas they believe require attention from the council (Audit Commission, 2005; Audit Commission, 2002). Medical organisations, specifically the UK National Health Service, use the term to assess the level of care needed by its patients and provided for by its staff (DOH, 2010; NICE, 2010). Medical studies, on the other hand, use the term quality of life to assess a disease's impact on an individual's comfort and ability to interact with society, and how a specific treatment is affecting these (Fayers and Machin, 2000).

The central idea behind using the term quality of life for all of these types of organisations is that people have an expectation of a certain level of health and the ability to interact with their culture and society. This ability can be defined in many different ways. For an international organisation it can mean a certain level of education or the ability to speak one's views without fear of retaliation from government officials or others in power. At the national level, the ability to interact with society may involve an individual's access to healthcare, law enforcement or a variety of social welfare programmes. Similarly, a local council may view the ability to interact with society as an assessment of an individual's feeling of safety within their own community, or by their access to certain resources, including green spaces, schools, shopping centres and/or hospitals. Within the medical community, this ability to interact will be profoundly influenced by the individual's physical condition and would therefore be very subjective. The use of the term quality of life for all of these organisations is dictated first by the type of their intended research, i.e. what exactly they are looking to assess and influence, and second by what information is available to them. International organisations use national statistics and census data to compile their reports and influence policy. National and local governments use questionnaires and surveys to assess funding allocation. Medical organisations use a combination of questionnaires and doctors' reports to assess both the physical impact of disease and treatment and the individual's reaction to these in order to decide on future treatment.

In archaeology the term quality of life is used to describe how people lived their lives in the past, i.e. their housing conditions, diet, daily activities and/or occupation, in the past, using the data available, for the purpose of assessing and comparing differences between populations. The data available to archaeologists is limited and can be biased, and will vary considerably between sites, but provided researchers are aware of these variations and limitations, and willing to take them into consideration when making conclusions, there is no reason the phrase should be avoided. However, any and all types of data should be included, as time and funding allow, in order to produce as full a picture of quality of life in the past as possible. In this research, for example, skeletal data was used to assess certain aspects of the health of people buried at medieval monastic institutions, artefactual data was used to explore evidence of types of activity performed, as well as social access and strata, and documentary data was used to assess monetary value of the various houses. The combination of these three lines of evidence enabled the examination of several aspects of the lives of the inhabitants of the monastic houses and enabled comments to be made on their quality of life and how it differed at the various types of house. As such, it is believed that the discussion of the term quality of life in relation to data from a variety of sources was appropriate.

5.5.2 Quality of life in medieval religious houses

The second and third goals of this research related to understanding the possible differences between quality of life at different types of monastic houses in medieval England. The question was: if an individual had no ascribed sex, regional ties, preferences for where they lived and no ideological ties to a particular monastic order, what combination of the eight variables (north, south, urban, rural, monastery, nunnery, old or reform order) would have provided that person with the best quality of life, both in terms of the body and the soul? As this research is based on only eight sites and the author did none of the primary data collection, only suggestions can be made about such an extremely complex question. The regional (north/south) and ideological (older/reform) groups were found to have the clearest differences, while the urban/rural and monastery/nunnery divides were more blurred.

It was found that the southern sites had a higher physical quality of life, while the northern sites had a higher spiritual. Similarly, the older order houses were found to have a higher physical quality of life, and the reform order houses had a higher spiritual. The urban and rural divide was not terribly clear and it was concluded that an average quality of life could be expected at either. The monastery and nunnery divide, however, was such that both a higher physical and spiritual quality of life could be expected at a monastery. This is in spite of the fact that the nunneries included in this research had evidence for a higher status diet and access to greater funds, although this is probably due to the unusual wealth of Elstow Abbey and Nunnaminster. The income evidence from nunneries throughout England show that, on average, nunneries were poorer than monasteries, and documentary sources suggest that there were many societal limitations on women

conducting business affairs, and that women's religious contributions were not valued as highly as men's. There was also skeletal and anecdotal evidence of potentially poor living conditions.

In summary, if this "clean slate" individual were to choose a house in which to live, this research suggests that, for the best physical quality of life, they should choose a southern monastery of one of the older orders, regardless of its vicinity to a city. If, however, they were seeking a better spiritual quality of life, they should choose a northern monastery belonging to one of the reform orders, again without regard to its vicinity to a city. On average, however, the difference between the groups, with the exception of the question of the sex of the inhabitants, was more often the result of wealth. So the "clean slate" individual would be more likely to experience a good physical quality of life at a monastery with money than one with financial difficulties. If, however, they wanted a good spiritual quality of life they would have been better off choosing a monastery with less financial security.

These results fulfilled the second and third goals of this research project, to assess the differences between the quality of life of the inhabitants of different monastic groups, in as much as any statement of this nature can be made regarding archaeological and historical data. However, these results were not entirely expected. The northern and southern site divide was as expected, as were the older and reform orders. The ambiguity in the data from the urban and rural houses was not. It was believed that the urban houses, due to their (potentially) higher wealth and status would have a significantly higher physical quality of life, while the rural house would have a higher spiritual quality of life, having been subjected to harsher living conditions. Although some of these ideas were upheld, this hypothesis failed to take into account the wealth of the rural houses.

Similarly, the differences between the quality of life at the nunneries and monasteries were less clear cut than was previously thought. While the poor living conditions at the nunneries were expected, the higher income was not. In addition to this, it was expected that the people from the monasteries would show indicators of dietary excess, as outlined by others (Spencer, 2008; Mays, 2006; Rogers and Waldron, 1995; Harvey, 2002; Gerald of Wales, 1979). As a result of the confusing picture provided by this evidence, it was concluded that the individuals living at monasteries had a better chance of a good quality of life for both their physical and spiritual bodies. This, however, is a very broad, simplified statement, and the evidence speaks of a far more complicated picture than may have been previously thought. This research, therefore, provides the base for further investigations into the understanding of quality of life at medieval monastic institutions and the factors that may have influenced it rather than a direct answer to the question of which type of institution provided the best quality of life.

This chapter first reviewed the data and contemporary views about the various religious houses and then concluded about quality of life for each of the eight (four pairs of) variables being explored. This was followed by a discussion of the appropriateness of the term quality of life and its application to archaeology. It closed with an assessment of the types of religious houses that would have provided the best physical and spiritual quality of life, based on the evidence available to this study. The following chapter will provide a summary of the research and include a discussion of suggestions for future work.

Chapter 6 Conclusion

The aims of this research, as outlined in Chapter 1 (also section 5.5), were all fulfilled. These aims were addressed using a multi-disciplinary approach including bioarchaeological, artefactual, and documentary evidence. A selection of eight health indicators were chosen for their ability to provide information about particular aspects of the lives of the individuals associated with the religious houses. The artefact assemblages were compared using a statistical method to assess where activities may have differed between the different kinds of houses. Finally, the documentary evidence regarding the income at Dissolution at these houses, as well as the pensions granted to the individuals living at each house, was compared to explore the wealth associated with the houses as well as the societal worth placed on the individuals. These data were combined and explored within a historical framework in order to identify differences in the physical and spiritual quality of life of the individuals associated with monastic institutions in medieval England.

6.1 Summary of Results

The results of that data are summarised below:

Monasteries and Nunneries

- Health Indicators
    - Both the corrected and element-wise prevalence rates of dental calculus, dental caries, and osteoarthritis were found to be significantly higher in the nunneries cemetery population.
    - The corrected prevalence rate of maxillary sinusitis was found to be significantly higher in the nunneries cemetery population.
- Artefact Assemblages
    - There were significantly more artefacts in the dress accessories, horse paraphernalia, household, religious paraphernalia, tools/industrial equipment, and the writing/reading artefact classes found at monasteries.
- Documents
    - Monasteries were found to have had significantly higher Dissolution values.

North and South

- Health Indicators
    - The element-wise prevalence rate of dental calculus was found to be significantly higher in the southern cemetery population.
    - The element-wise prevalence rate of dental caries was found to be significantly higher in the northern cemetery population.
    - The corrected prevalence rate of maxillary sinusitis was found to be significantly higher

in the northern cemetery population.
    - Both the corrected and element-wise prevalence rates of non-specific infection and trauma were found to be significantly higher in the northern cemetery population.
- Artefact Assemblages
    - There were significantly more artefacts in the dress accessories and horse paraphernalia artefact classes found at southern houses.
    - There were significantly more artefacts in the hygiene, money, religious paraphernalia, tools/industrial equipment, and writing/reading artefact classes found at northern houses.
- Documents
    - The southern houses were found to have significantly higher Dissolution values.

Urban and Rural

- Health Indicators
    - Both the corrected and element-wise prevalence rates of dental calculus and caries were found to be significantly higher in the cemetery population of rural houses.
    - The corrected prevalence rates of both maxillary sinusitis and non-specific infection were found to be significantly higher in the cemetery population of rural houses.
    - The element-wise prevalence rate of osteoarthritis was found to be significantly higher in the cemetery population of rural houses.
- Artefact Assemblages
    - There were significantly more artefacts in the dress accessories, horse paraphernalia, and household artefact classes at rural houses.
    - There were significantly more artefacts in the gaming, hygiene, jewellery, religious paraphernalia, tools/industrial equipment, weapons, and writing/reading artefact classes at urban houses
- Documents
    - There was no significant difference in the Dissolution values.

Older and Reform Orders

- Health Indicators
    - The element-wise prevalence rates of both dental calculus and DISH were significantly higher in the cemetery population of the older orders.
    - The corrected prevalence rate of maxillary sinusitis was significantly higher in the cemetery population of the reform orders.
    - Both the corrected and element-wise prevalence rates of non-specific infection and trauma were significantly higher in the cemetery population of the reform orders.
- Artefact Assemblages
    - There were significantly more artefacts in the dress accessories, horse paraphernalia, and

household artefact classes at the older orders.
    - There were significantly more artefacts in the hygiene, religious paraphernalia, tools/industrial equipment, and writing/reading artefact classes at the reform orders.
- Documents
    - The older orders were found to have significantly higher Dissolution values.

The following section will discuss how these results fulfilled the original research aims:

1. To consider the validity or suitability of the phrase "quality of life" (QoL) when studying the lives of archaeological populations
2. To explore the differences, if any, between the quality of life of the inhabitants of different monastic groups according to gender (nunneries and monasteries).
3. To detect any inequality in the QoL between northern and southern houses, urban and rural sites and between orders (older and reform orders).

6.2 Research Aim One

The use of the phrase 'quality of life' has often been avoided in relation to archaeological and historical populations, as it is often seen as needing to encompass the more subjective aspects of individual life, information that is not available for a historical population (Chapter 1). However, as was discussed in Chapter 2, while the idea of quality of life encompasses all of these things, the phrase itself is more often used to describe aspects of this all-consuming idea, specifically the aspects different organisations wish to highlight for their own research or socio-political agendas. For example, the United Nations publishes a review of the quality of life of individuals in different countries by researching population level statistics, while medical research relies heavily on personal questionnaires to assess their patients' quality of life (HDR, 2007/8, p. 1990; Fayers and Machin, 2000). Both types of research use the phrase quality of life but explore only aspects of the whole using the information that is both pertinent to their field and readily available. As such, it is the conclusion of this research that the phrase 'quality of life' can be applied to archaeological and historical research, as those aspects of quality of life that are deducible from archaeological information can be researched and discussed.

However, it can only effectively be used provided the research explores as many types of data as are available and makes conclusions about quality of life with caution and an understanding of the limitations of the data. The importance of defining which areas of quality of life are being addressed is imperative if the phrase is to be used. If a study is discussing only the physical aspects of quality of life with no discussion of the social framework within which these individuals lived, then this is more aptly covered by the phrase standard of living. However, if a study is researching only the physical aspects of quality of life, but taking the time to discuss the results in phrases of a social, economic, and cultural framework than the phrase "quality of life" is applicable.

6.3 Research Aims Two and Three

This research used a combination of bioarchaeological, archaeological and documentary evidence, firmly grounded in discussions of the sociopolitical structure of medieval England, to draw conclusions about the possible differences in quality of life at medieval monasteries and nunneries. By applying a critical analysis of the prevalence rates of eight health indicators within the skeletal populations, documentary evidence of the financial situation of each of the houses and their artefact assemblages it has been possible to draw tentative conclusions about the types of houses that would have provided their inhabitants with a high physical or spiritual quality of life (Chapter 5). Due to the problems associated with using so many scholars' analyses, however, these conclusions are only speculative. This, however, was necessary, due to time and monetary constraints and the fact that several of the skeletal collections have been reburied.

As discussed more fully in the previous chapter, significant differences were found in the bioarchaeological, artefactual, and documentary evidence between the different types of sites. However, most of the differences appeared to indicate higher physical quality of life for the wealthier sites compared to the poorer sites, with the reverse for spiritual quality of life. The exception to this, however, was in the comparison of the nunneries and monasteries. The nunneries included in this research were found to be, on average, wealthier than the monasteries, but were found to have a poorer physical and spiritual quality of life. This was primarily the result of the social constructs placed on women in the Middle Ages as well as ecclesiastical feelings about their religious worth.

Aims two and three were fulfilled within the limitations of the study. The tentative conclusions are that wealth had more to do with physical (or spiritual) quality of life than location or ideology, and that societal value of religious contributions had a significant influence on spiritual quality of life. This does not mean, however, that these results are definitive.

6.4 Limitations of the Data

The limitations of the both the data and this research project in particular were discussed in Section 5.1, but will be given a brief overview here. First the limitations of bioarchaeology will be discussed, followed by artefacts, and then documents.

Monastic research using skeletal remains is first limited by the inability to differentiate monks and nuns from the lay people buried in the monastic cemeteries, as was common in the medieval period (Gilchrist and Sloane, 2005, p. 32). There are also the limitations inherent in bioarchaeology as a field, which include the varying survival of organic material depending on the original

circumstances of burial, the soil compositions, later animal activity, and later disturbances by additional graves (Roberts, 2009, p. 6-7; Gordon and Buisktra, 1981)

The various research methods used to assess age, sex, and disease markers will also vary depending on their date of publication and the expertise of the original researcher (Roberts, 2009, p. 141-2; Waldron, 1994). These factors, as well as the problems associated with interobserver error, could have an effect on the demographic profiles of the various sites.

As with the study of human remains, artefact survivability and recovery are heavily affected by differences in excavation processes, soil composition, and other taphonomic changes (Andrews and Fernandez-Jalvo, 2012; Graesch, 2009, p. 776; Bartosiewicz, 2008; Dibble et al., 2005, p. 218, 317-8; Orton, 2000, p. 49). Additionally, as with bioarchaeology, different researchers will have differing opinions on the classification of artefacts.

The documents available for different monastic houses will vary as not all houses produced and/or kept a large volume of written records (Bell, 2007, p. 116). Any original content could also contain mistakes, exaggerations, and/or underestimations of the financial situation of the house in question (Knowles, 1976, p. 171-4). As with any other organic material, parchment is subject to decay and this affects the number of records available for study (Dolgin et al., 2007). The specific limitations of both the *Valor Ecclesiasticus* and the *Monasticon Anglicanum* were discussed in Section 3.5.

An overall limitation of this work (and any archaeological study which compares a variety of excavations) is that each site was excavated to differing degrees and focused on different aspects of the particular religious house. This could substantially affect the types of artefacts and the number of individuals unearthed at each site.

One problem with conducting research associated with nunneries is the general lack of excavation of female religious houses. Only four female religious houses with cemeteries in England with have been excavated and only one in Scotland. This is in part the result of the largely urban nature of many nunneries, which has resulted in the destruction of the original site. It is also the result of a lack of interest in female religious life in the early years of monastic research. This is further compounded by the lack of surviving documentation for individual houses.

Another overall limitation was imposed on this research in an attempt to maintain a more generalised focus on the research topic and that is the use of the later medieval period (1100-1540) as a single time period. There were a number of social, cultural, economic, and political changes that occurred during this 400 year period that would have had an impact on individual and group

quality of life. However, given the lack of information for the dates of individual skeletal individuals, the decision was taken to maintain a more general focus.

6.5 Research Contribution

Taken as a whole, this research project has made significant methodological advances in investigating medieval monastic communities as well as the field of archaeology as a whole.

Within the field of monastic research, the suggestion that, while there were clearly a number of factors that influenced the quality of life of medieval monks and nuns, the actual wealth of the house likely played a key role was not surprising, but had not been quantitatively tested before this research. This research has found evidence that the location and ideology of a religious house had less impact on the quality of life of the inhabitants than the wealth of the house.

The specific advances made include the use of large same sizes, the exploration of a number of different potential factors that could have influenced quality of life, and the analysis of multiple types of data. Research of a similar kind exploring large numbers of sites based on specific criteria could be used in all areas of archaeology to assess potential differences in quality of life between groups of individuals living within the same general area and culture.

Additionally, the investigation and use of the phrase "quality of life," as it pertains to historic peoples, has never been undertaken. The benefits of using this phrase is not only the more holistic approach it requires in the investigation of the lives of past communities, but also because of the understandability of the phrase to the general public. Using phases that improve the accessibility of archaeological research can function to attract greater public awareness and interest.

6.6 Future Work

This research provides the basis for the first recommendation for future work, specifically that these methods and results are tested through an examination of a different selection of religious houses. Ideally, the selection of houses would be larger and would allow for more criteria to be tested; some possibilities include the comparison of other regions within England or countries in the United Kingdom.

Additionally, carrying out comparisons that control for one of the aspects tested in this research, for example comparing only Benedictine houses, might give a greater understanding of the impact of the other factors. Given the influence that income may be having on quality of life, a comparison based on income (or valuation) would also be useful in creating a more complete understanding of the factors influencing medieval religious quality of life.

Including other types of religious institution, hospitals, colleges, or cathedral churches, for example, is another possibility for future research. These institutions had different incomes and, in the case of hospitals, significantly different contact with the outside world. Comparing these other types of religious house would offer further insight into the wide range of opportunities available to individuals seeking a religious life and the effect their choice might have had on their quality of life.

A comparison could also be carried out on an international scale, comparing UK religious houses with other houses on the continent. Research of this kind would allow for comparison of more extreme environmental conditions, but also serve to highlight and investigate the potential differences that subtle cultural and political differences might have had on quality of life.

Further methods could also be used to gain a wider understanding of where the differences in quality of life may have lay. Isotopic analysis could be used in future to identify differences in diet, specifically those individuals subsisting on primarily aquatic protein and those relying on land animals (Polet and Katzenberg, 2003). Analysis of surviving buildings could also give information about the materials used to build the different types of houses and how the use or layout of the buildings could have impacted on the inhabitants' quality of life (Gilchrist, 1994). Additional research including comparison of the placement and landscape of various houses could suggest what influence the landscape had on the quality of life of the inhabitants, especially given the importance placed on choosing a site for a new monastic house (Coppack, 1990, p. 99).

Further work could include the comparison of tensions of the religious personnel, as found in the *Valor Ecclesiasticus*. These could also shed light on the perceived religious significance of the different houses. A study of this nature could also include a comparison of the income data from the 1291 Taxation of Pope Nicholas (*Taxatio Ecclesiastica*), although nunneries were exempt from this tax, as well as foundation information included in the *Valor Ecclesiasticus* and the *Monasticon Anglicanum* to assess differences in income and wealth throughout the later medieval period.

Outside of the possibilities for future work in the subfield of monastic archaeology, the process developed for this research could similarly be applied to comparing lay communities to assess differences in wealth, regionality, location, and a variety of other possible influences on quality of life. There are several large lay cemeteries that could be used for comparison, including Spitalfields, London; Wharram Percy, North Yorkshire; or Barton-on-Humber, Lincolnshire.

Although the availability of the specific types of data used in this research, i.e. human remains, artefacts, and financial information, could vary considerably, the use of a similar method could be used to explore quality of life in different archaeological periods. This is not to suggest that it is

possible, using this methodology, to compare quality of life between periods, as the socio-cultural ideas about quality of life would be impossible to overcome. The method, however, could be used to explore quality of life within a single period, provided sufficient data was available.

Depending on the information available, comparisons could be made using animal remains, pollen data on the types of crops grown, tax records, settlement size (in square metres), distance to major trading centres, and any other quantifiable data. For societies with more complete census or other governmental records, comparisons could be made between number of reported crimes, police complaints, marriage rates, school registration numbers, etc. This could then be compared to the archaeological remains of the site, including building materials, artefact diversity, zooarchaeological diversity and demography, etc.

The final area of future work that this piece of research can recommend is in the improved management of historical records and archaeological material. The difficulty had in establishing the location and viability of excavation records caused a number of set backs in this research. A centralised database of excavation records and storage of these records would have prevented at least three wasted research trips and potentially allowed the inclusion of more types of data, as the loss of time prevented the exploration of additional material. Standardisation in the recording of artefacts and human remains would also have allowed for a more streamlined data-entry process.

Similarly, the ability to draw conclusions would be significantly improved were the sites being compared excavated across similar areas of the estate, something that is made more difficult by the often piece-meal nature of many commercial excavations. These excavations are carried out based on the needs of the proposed development, rather than the potential academic use of the archaeological material. Excavations that are planned based on both the commercial requirements as well as the academic interests would produce data of a more comparable and informative nature.

In conclusion, this research has explored a new way of looking at monastic life in the Middle Ages. It has found that income and wealth had potentially more bearing on the quality of life of those associated with religious houses than ideology or location. That being said, however, the sex of the inhabitants could significantly affect their quality of life, either physical or spiritual, due to societal views of the religious value of women. The full effect of this view on quality of life should be explored, as it would increase the understanding of women's role and status in medieval society. In short, more research is, as always, needed to more fully understand the differences in the actual, day-to-day quality of life of monks and nuns.

Appendix A: Input forms for database

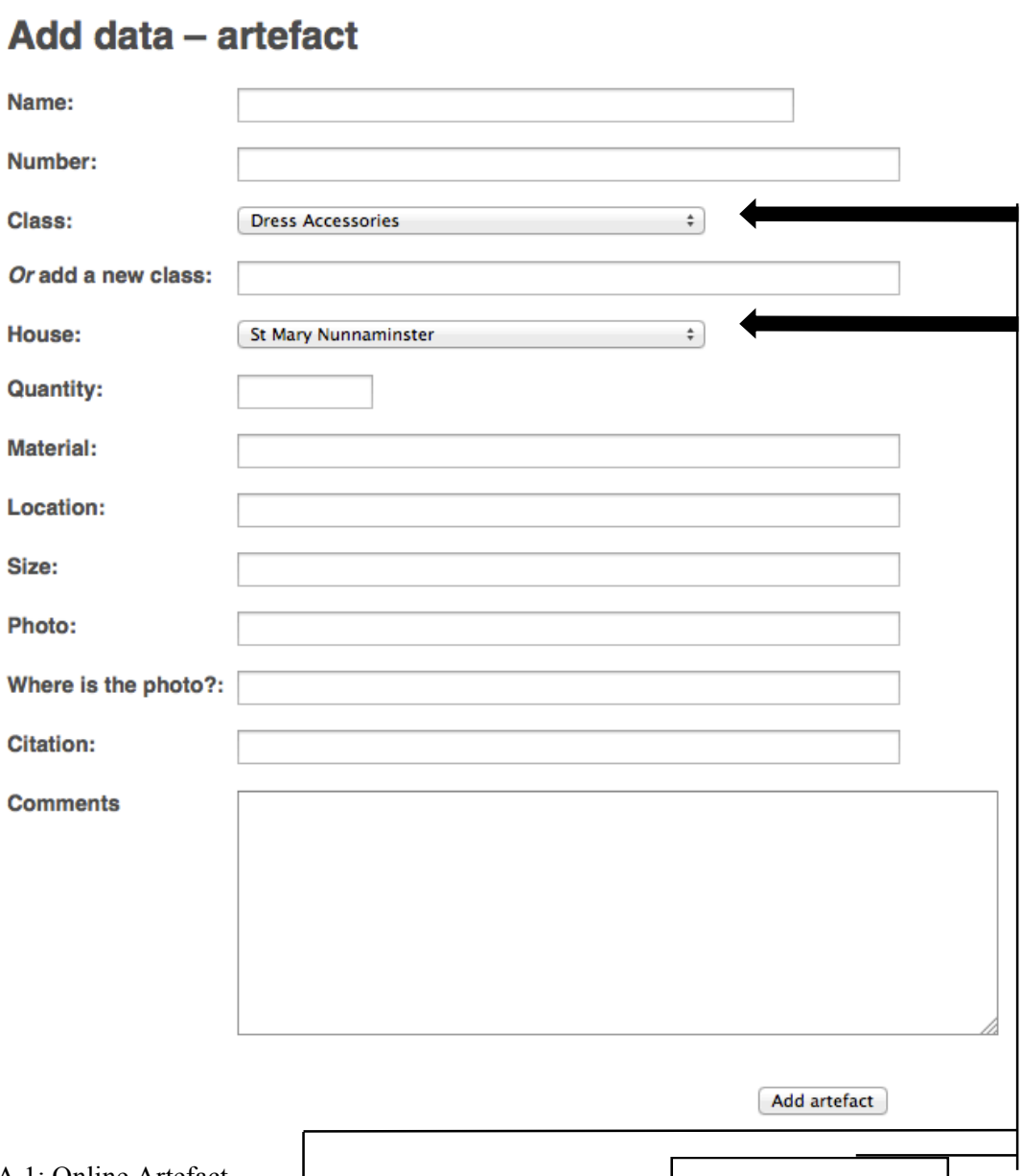


Figure A.1: Online Artefact Recording Form

Dropdown menu:
- St Mary Nunnaminster
- Clementhorpe
- Sinningthwaite
- Elstow
- St James Bristol
- Hulton
- St Andrews
- Hull Austin

Dropdown menu:
- Dress Accessories
- Game
- Horse
- Household
- Hygiene
- Jewellery
- Money
- Music
- Religious
- Textile
- Timekeeping
- Tools/Industrial
- Weapons
- Writing/Reading

Figure A2: Online Skeletal Recording Form

Add data – human remains

House: St Mary Nunnaminster

Sex:

Age:

Location:

Burial:

Stature:

Dropdown menu:
- St Mary Nunnaminster
- Clementhorpe
- Sinningthwaite
- Elstow
- St James Bristol
- Hulton
- St Andrews
- Hull Austin

Health Indicators

Maxillary sinusitis: Present

Comments:

Dropdown menu:
- Present
- Fragmentary
- Absent

Rib periostitis: Present

Comments:

Non-specific infections: Present

Comments:

Calculus: Present

Comments:

Caries: Present

Comments:

DISH: Present

Comments:

Osteoarthritis: Present

Comments:

Trauma: Present

Comments:

Photo:

Where is the photo?:

Comments:

Skull:

Teeth **Ribs** **C Vert** **T Vert** **L Vert**

Mandible
- Present
- Fragmentary

Sternum
- Present
- Fragmentary

L Scapula
- Present
- Fragmentary

R Scapula
- Present
- Fragmentary

L Clavicle
- Present
- Fragmentary

R Clavicle
- Present
- Fragmentary

L Humerus
- Present
- Fragmentary

R Humerus
- Present
- Fragmentary

Sacrum
- Present
- Fragmentary

L Ulna
- Present
- Fragmentary

R Ulna
- Present
- Fragmentary

Other elements

L Radius
- Present
- Fragmentary

R Radius
- Present
- Fragmentary

L Hand
- Present
- Fragmentary

R Hand
- Present
- Fragmentary

L Innom
- [ ] Present
- [ ] Fragmentary

R Innom
- [ ] Present
- [ ] Fragmentary

L Fibula
- [ ] Present
- [ ] Fragmentary

R Fibula
- [ ] Present
- [ ] Fragmentary

L Femur
- [ ] Present
- [ ] Fragmentary

R Femur
- [ ] Present
- [ ] Fragmentary

L Foot
- [ ] Present
- [ ] Fragmentary

R Foot
- [ ] Present
- [ ] Fragmentary

L Tibia
- [ ] Present
- [ ] Fragmentary

R Tibia
- [ ] Present
- [ ] Fragmentary

Add human remains

Appendix B: Results of statistical tests

Human Remains:

Nunneries and Monasteries

Table B1: Results of statistical test comparing monasteries and nunneries

Health Indicator	**X^2**	**p**	**Higher rate/ Not significant**
Dental Calculus Corrected Prevalence Rate	171.25	2.70E-40	Nunneries
Dental Calculus Elements-wise Prevalence Rate	2271.64	0.00E+00	Nunneries
Dental Caries Corrected Prevalence Rate	24.18	8.76E-07	Nunneries
Dental Caries Elements-wise Prevalence Rate	145.52	1.65E-33	Nunneries
DISH Corrected Prevalence Rate	0.47	0.49	Not significant
DISH Elements-wise Prevalence Rate	0.61	0.43	Not significant
Maxillary Sinusitis Corrected Prevalence Rate	3.79	0.05	Nunneries
Non-Specific Infection Corrected Prevalence Rate	0.19	0.66	Not significant
Non-Specific Infection Elements-wise Prevalence Rate	0.15	0.70	Not significant
Osteoarthritis Corrected Prevalence Rate	97.00	6.93E-23	Nunneries
Osteoarthritis Elements-wise Prevalence Rate	645.94	1.71E-142	Nunneries
Rib Periostitis Corrected Prevalence Rate	0.50	0.48	Not significant
Trauma Corrected Prevalence Rate	1.40	0.24	Not significant
Trauma Elements-wise Prevalence Rate	1.37	0.24	Not significant

Table B2: Age and Sex Distribution of Dental Calculus in Nunneries Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	1	--	--	--	0-2	4	--	--	--
2-6	3	--	--	--	2-6	6	--	--	--
6-10	2	--	--	--	6-10	6	--	--	--
10-17	7	0	1	--	10-17	103	0	8	--
Juvenile	0	0	0	--	Juvenile	0	0	0	--
17-25	--	7	18	2	17-25	--	97	383	29
25-35	--	10	18	1	25-35	--	132	330	27
35-45	--	10	18	2	35-45	--	203	342	34
45+	--	26	34	2	45+	--	352	358	8
Adult	--	4	9	3	Adult	--	61	116	48

Table B3: Age and Sex Distribution of Dental Calculus in Monasteries Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--	0-2	0	--	--	--
2-6	0	--	--	--	2-6	0	--	--	--
6-10	0	--	--	--	6-10	0	--	--	--
10-17	0	0	0	--	10-17	0	57	0	--
Juvenile	0	0	0	--	Juvenile	0	0	0	--
17-25	--	3	4	1	17-25	--	79	110	5
25-35	--	10	6	0	25-35	--	159	113	0
35-45	--	17	2	0	35-45	--	347	47	0
45+	--	14	0	1	45+	--	253	0	19
Adult	--	3	1	1	Adult	--	13	3	5

Table B4: Age and Sex Distribution of Dental Caries in Nunneries Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	2	--	--	--	0-2	2	--	--	--
2-6	3	--	--	--	2-6	14	--	--	--
6-10	1	--	--	--	6-10	6	--	--	--
10-17	3	0	0	--	10-17	4	0	0	--
Juvenile	0	0	0	--	Juvenile	1	0	0	--
17-25	--	2	11	1	17-25	--	2	18	2
25-35	--	3	14	0	25-35	--	9	28	0
35-45	--	6	17	1	35-45	--	8	57	4
45+	--	17	14	1	45+	--	50	53	2
Adult	--	3	5	5	Adult	--	14	9	20

Table B5: Age and Sex Distribution of Dental Caries in Monasteries Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	1	--	--	--	0-2	2	--	--	--
2-6	1	--	--	--	2-6	5	--	--	--
6-10	3	--	--	--	6-10	3	--	--	--
10-17	4	2	0	--	10-17	4	2	0	--
Juvenile	0	0	0	--	Juvenile	0	0	0	--
17-25	--	5	2	1	17-25	--	9	9	1
25-35	--	15	6	1	25-35	--	36	19	1
35-45	--	17	2	0	35-45	--	31	2	0
45+	--	19	1	4	45+	--	28	3	5
Adult	--	4	1	1	Adult	--	8	4	1

Table B6: Age and Sex Distribution of DISH in Nunneries Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
25-35	--	1	0	0	25-35	--	5	0	0
35-45	--	0	1	0	35-45	--	0	4	0
45+	--	2	0	0	45+	--	24	0	0
Adult	--	0	0	0	Adult	--	0	0	0

Table B7: Age and Sex Distribution of DISH in Monasteries Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
25-35	--	2	0	0	25-35	--	9	0	0
35-45	--	0	0	0	35-45	--	0	0	0
45+	--	18	3	0	45+	--	100	15	0
Adult	--	3	1	0	Adult	--	15	5	0

Table B8: Age and Sex Distribution of Maxillary Sinusitis in Nunneries Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	1	--	--	--
6-10	0	--	--	--
10-17	0	0	0	--
Juvenile	0	0	0	--
17-25	0	0	2	0
25-35	--	0	0	0
35-45	--	0	1	0
45+	--	6	9	0
Adult	--	0	0	0

Table B9: Age and Sex Distribution of Maxillary Sinusitis in Monasteries Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	1	--	--	--
6-10	1	--	--	--
10-17	1	1	0	--
Juvenile	0	0	0	--
17-25	0	2	0	0
25-35	--	5	1	0
35-45	--	4	1	0
45+	--	4	0	0
Adult	--	2	1	0

Table B10: Age and Sex Distribution of Non-Specific Infection in Nunneries Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	1	--	--	--	0-2	0	--	--	--
2-6	2	--	--	--	2-6	2	--	--	--
6-10	0	--	--	--	6-10	0	--	--	--
10-17	3	0	0	--	10-17	1	0	0	--
Juvenile	0	0	0	--	Juvenile	0	0	0	--
17-25	0	2	6	0	17-25	0	6	17	0
25-35	--	1	7	0	25-35	--	3	19	0
35-45	--	4	5	0	35-45	--	11	10	0
45+	--	19	17	2	45+	--	53	34	5
Adult	--	2	3	3	Adult	--	5	6	4

Table B11: Age and Sex Distribution of Non-Specific Infection in Monasteries Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	1	--	--	--	0-2	2	--	--	--
2-6	0	--	--	--	2-6	0	--	--	--
6-10	1	--	--	--	6-10	1	--	--	--
10-17	3	2	0	--	10-17	7	4	0	--
Juvenile	0	0	0	--	Juvenile	0	0	0	--
17-25	0	14	3	0	17-25	0	38	7	0
25-35	--	29	11	0	25-35	--	67	33	0
35-45	--	46	12	0	35-45	--	125	27	0
45+	--	37	11	1	45+	--	104	35	1
Adult	--	18	14	20	Adult	--	38	34	45

Table B12: Age and Sex Distribution of Osteoarthritis in Nunneries Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
17-25	0	3	7	0	17-25	0	3	9	0
25-35	--	7	6	0	25-35	--	20	16	0
35-45	--	7	10	0	35-45	--	9	27	0
45+	--	30	37	1	45+	--	118	151	9
Adult	--	6	8	0	Adult	--	9	12	0

Table B13: Age and Sex Distribution of Osteoarthritis in Monasteries Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
17-25	0	0	1	1	17-25	0	0	1	0
25-35	--	5	2	0	25-35	--	5	2	0
35-45	--	22	2	0	35-45	--	36	2	0
45+	--	35	7	3	45+	--	62	7	3
Adult	--	7	6	1	Adult	--	11	6	1

Table B14: Age and Sex Distribution of Rib Periostitis in Nunneries Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	0	--	--	--
6-10	0	--	--	--
10-17	0	0	0	--
Juvenile	0	0	0	--
17-25	0	0	0	0
25-35	--	1	0	0
35-45	--	1	0	0
45+	--	1	0	0
Adult	--	0	0	0

Table B15: Age and Sex Distribution of Rib Periostitis in Monasteries Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	2	--	--	--
6-10	1	--	--	--
10-17	0	0	0	--
Juvenile	0	0	0	--
17-25	0	1	0	0
25-35	--	4	0	0
35-45	--	1	0	0
45+	--	0	0	0
Adult	--	1	0	0

Table B16: Age and Sex Distribution of Trauma in Nunneries Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--	0-2	0	--	--	--
2-6	0	--	--	--	2-6	0	--	--	--
6-10	0	--	--	--	6-10	0	--	--	--
10-17	0	0	0	--	10-17	0	0	0	--
Juvenile	0	0	0	--	Juvenile	0	0	0	--
17-25	0	0	1	0	17-25	0	0	1	0
25-35	--	0	2	0	25-35	--	0	2	0
35-45	--	1	1	0	35-45	--	1	1	0
45+	--	5	4	0	45+	--	7	5	0
Adult	--	3	3	0	Adult	--	4	4	0

Table B17: Age and Sex Distribution of Trauma in Monasteries Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--	0-2	0	--	--	--
2-6	0	--	--	--	2-6	0	--	--	--
6-10	0	--	--	--	6-10	0	--	--	--
10-17	2	0	0	--	10-17	4	0	0	--
Juvenile	0	0	0	--	Juvenile	0	0	0	--
17-25	0	0	0	0	17-25	0	0	0	0
25-35	--	3	3	0	25-35	--	3	4	0
35-45	--	8	2	0	35-45	--	9	2	0
45+	--	13	3	0	45+	--	16	5	0
Adult	--	6	1	2	Adult	--	10	2	2

Northern and Southern Houses

Table B18: Results of statistical test comparing northern and southern houses

Health Indicator	**X^2**	**p**	**Higher rate/ Not significant**
Dental Calculus Corrected Prevalence Rate	0.46	0.50	Not significant
Dental Calculus Elements-wise Prevalence Rate	297.692	1.05E-66	Southern
Dental Caries Corrected Prevalence Rate	0.74	0.39	Not significant
Dental Caries Elements-wise Prevalence Rate	4.96	0.03	Southern
DISH Corrected Prevalence Rate	0.35	0.55	Not significant
DISH Elements-wise Prevalence Rate	3.39	0.07	Not significant
Maxillary Sinusitis Corrected Prevalence Rate	14.50	1.41E-04	Northern
Non-Specific Infection Corrected Prevalence Rate	49.64	1.85E-12	Northern
Non-Specific Infection Elements-wise Prevalence Rate	139.71	3.07E-32	Northern
Osteoarthritis Corrected Prevalence Rate	2.08	0.15	Not significant
Osteoarthritis Elements-wise Prevalence Rate	0.26	0.61	Not significant
Rib Periostitis Corrected Prevalence Rate	0.77	0.38	Not significant
Trauma Corrected Prevalence Rate	8.94	2.78E-03	Northern
Trauma Elements-wise Prevalence Rate	7.88	5.00E-03	Northern

Table B19: Age and Sex Distribution of Dental Calculus in Northern Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	1	--	--	--		4	--	--	--
2-6	3	--	--	--		6	--	--	--
6-10	1	--	--	--		1	--	--	--
10-17	6	0	1	--		80	0	8	--
Juvenile	0	0	0	--		0	0	0	--
17-25	--	6	9	1		--	77	161	22
25-35	--	7	13	0		--	58	207	0
35-45	--	11	14	2		--	194	267	34
45+	--	25	33	2		--	355	345	8
Adult	--	2	3	2		--	16	33	26

Table B20: Age and Sex Distribution of Dental Calculus in Southern Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	1	--	--	--		5	--	--	--
10-17	1	0	0	--		23	57	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	--	4	13	2		--	99	332	12
25-35	--	13	11	1		--	233	236	27
35-45	--	16	6	0		--	356	122	0
45+	--	15	1	1		--	250	13	19
Adult	--	5	7	2		--	58	86	27

Table B21: Age and Sex Distribution of Dental Caries in Northern Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	3	--	--	--		4	--	--	--
2-6	4	--	--	--		19	--	--	--
6-10	2	--	--	--		7	--	--	--
10-17	3	0	0	--		3	0	0	--
Juvenile	0	0	0	--		1	0	0	--
17-25	--	3	4	0		--	4	8	0
25-35	--	7	12	0		--	17	30	0
35-45	--	16	14	1		--	27	51	4
45+	--	21	15	1		--	56	56	2
Adult	--	4	2	3		--	8	4	10

Table B22: Age and Sex Distribution of Dental Caries in Southern Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	2	--	--	--		2	--	--	--
10-17	4	2	0	--		5	2	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	--	4	9	2		--	7	19	3
25-35	--	11	8	1		--	28	17	1
35-45	--	7	5	0		--	12	8	0
45+	--	15	0	4		--	22	0	5
Adult	--	3	4	3		--	14	9	11

Table B23: Age And Sex Distribution Of Dish in Northern Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
25-35	--	1	0	0		--	5	0	0
35-45	--	0	1	0		--	0	4	0
45+	--	14	3	0		--	91	15	0
Adult	--	1	1	0		--	5	5	0

Table B24: Age and Sex Distribution of DISH in Southern Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
25-35	--	2	0	0		--	9	0	0
35-45	--	0	0	0		--	0	0	0
45+	--	6	0	0		--	33	0	0
Adult	--	2	0	0		--	10	0	0

Table B25: Age and Sex Distribution of Maxillary Sinusitis in Northern Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	2	--	--	--
6-10	1	--	--	--
10-17	1	1	0	--
Juvenile	0	0	0	--
17-25	0	2	1	0
25-35	--	5	1	0
35-45	--	4	2	0
45+	--	9	9	0
Adult	--	2	1	0

Table B26: Age and Sex Distribution of Maxillary Sinusitis in Southern Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	0	--	--	--
6-10	0	--	--	--
10-17	0	0	0	--
Juvenile	0	0	0	--
17-25	0	0	1	0
25-35	--	0	0	0
35-45	--	0	0	0
45+	--	1	0	0
Adult	--	0	0	0

Table B27: Age and Sex Distribution of Non-Specific Infection in Northern Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	1	--	--	--		0	--	--	--
2-6	2	--	--	--		2	--	--	--
6-10	1	--	--	--		1	--	--	--
10-17	6	2	0	--		8	4	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	0	13	9	0		0	37	24	0
25-35	--	25	17	0		--	62	50	0
35-45	--	48	17	0		--	131	37	0
45+	--	44	28	2		--	136	69	5
Adult	--	14	11	18		--	37	27	38

Table B28: Age and Sex Distribution of Non-Specific Infection in Southern Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	1	--	--	--		2	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	0	--	--	--		0	--	--	--
10-17	0	0	0	--		0	0	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	0	3	0	0		0	7	0	0
25-35	--	5	1	0		--	8	2	0
35-45	--	2	0	0		--	5	0	0
45+	--	12	0	1		--	21	0	1
Adult	--	6	6	5		--	6	13	11

Table B29: Age and Sex Distribution of Osteoarthritis in Northern Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
17-25	0	1	2	0		0	1	2	0
25-35	--	4	4	0		--	3	4	0
35-45	--	20	9	0		--	34	18	0
45+	--	45	41	1		--	129	148	9
Adult	--	5	5	0		--	7	5	0

Table B30: Age and Sex Distribution of Osteoarthritis in Southern Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
17-25	0	2	6	1		0	2	8	0
25-35	--	8	4	0		--	22	14	0
35-45	--	9	3	0		--	11	11	0
45+	--	20	3	3		--	51	10	3
Adult	--	8	9	1		--	13	13	1

Table B31: Age and Sex Distribution of Rib Periostitis in Northern Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	2	--	--	--
6-10	1	--	--	--
10-17	0	0	0	--
Juvenile	0	0	0	--
17-25	0	1	0	0
25-35	--	4	0	0
35-45	--	2	0	0
45+	--	0	0	0
Adult	--	1	0	0

Table B32: Age and Sex Distribution of Rib Periostitis in Southern Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	0	--	--	--
6-10	0	--	--	--
10-17	0	0	0	--
Juvenile	0	0	0	--
17-25	0	0	0	0
25-35	--	1	0	0
35-45	--	0	0	0
45+	--	1	0	0
Adult	--	0	0	0

Table B33: Age and Sex Distribution of Trauma in Northern Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	0	--	--	--		0	--	--	--
10-17	2	0	0	--		4	0	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	0	0	0	0		0	0	0	0
25-35	--	3	5	0		--	3	6	0
35-45	--	8	3	0		--	9	3	0
45+	--	18	7	0		--	23	10	0
Adult	--	7	1	0		--	10	2	0

Table B34: Age and Sex Distribution of Trauma in Southern Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	0	--	--	--		0	--	--	--
10-17	0	0	0	--		0	0	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	0	0	1	0		0	0	1	0
25-35	--	0	0	0		--	0	0	0
35-45	--	1	0	0		--	1	0	0
45+	--	0	0	0		--	0	0	0
Adult	--	2	3	2		--	4	4	2

Urban and Rural Houses

Table B35: Results of statistical test comparing urban and rural houses

Health Indicator	**X^2**	**p**	**Higher rate/ Not significant**
Dental Calculus Corrected Prevalence Rate	190.52	2.45E-43	Rural
Dental Calculus Elements-wise Prevalence Rate	2348.39	0.00E+00	Rural
Dental Caries Corrected Prevalence Rate	43.30	4.71E-11	Rural
Dental Caries Elements-wise Prevalence Rate	144.95	2.20E-33	Rural
DISH Corrected Prevalence Rate	0.49	0.48	Not significant
DISH Elements-wise Prevalence Rate	0.32	0.57	Not significant
Maxillary Sinusitis Corrected Prevalence Rate	11.49	7.01E-04	Rural
Non-Specific Infection Corrected Prevalence Rate	10.91	9.54E-04	Rural
Non-Specific Infection Elements-wise Prevalence Rate	0.97	0.32	Not significant
Osteoarthritis Corrected Prevalence Rate	0.73	0.39	Not significant
Osteoarthritis Elements-wise Prevalence Rate	100.93	9.55E-24	Rural
Rib Periostitis Corrected Prevalence Rate	2.10E-03	0.96	Not significant
Trauma Corrected Prevalence Rate	1.14	0.29	Not significant
Trauma Elements-wise Prevalence Rate	0.60	0.44	Not significant

Table B36: Age and Sex Distribution of Dental Calculus in Urban Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	1	--	--	--		5	--	--	--
10-17	2	0	0	--		44	0	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	--	5	8	1		--	102	175	22
25-35	--	10	8	1		--	122	132	27
35-45	--	15	8	2		--	335	170	34
45+	--	10	5	1		--	212	34	19
Adult	--	3	7	1		--	37	81	16

Table B36: Age and Sex Distribution of Dental Calculus in Rural Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	1	--	--	--		4	--	--	--
2-6	3	--	--	--		6	--	--	--
6-10	1	--	--	--		1	--	--	--
10-17	5	0	1	--		59	57	8	--
Juvenile	0	0	0	--		0	0	0	--
17-25	--	5	14	2		--	74	318	12
25-35	--	10	16	0		--	169	311	0
35-45	--	12	12	0		--	215	219	0
45+	--	30	29	2		--	393	324	8
Adult	--	4	3	3		--	37	38	37

Table B37: Age and Sex Distribution of Dental Caries in Urban Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	1	--	--	--		2	--	--	--
2-6	1	--	--	--		5	--	--	--
6-10	3	--	--	--		3	--	--	--
10-17	4	0	0	--		4	0	0	--
Juvenile	0	0	0	--		1	0	0	--
17-25	--	5	4	1		--	6	12	1
25-35	--	11	10	1		--	25	26	1
35-45	--	16	11	1		--	26	46	4
45+	--	19	3	4		--	28	7	5
Adult						--	7	4	2

Table B38: Age and Sex Distribution of Dental Caries in Rural Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	2	--	--	--		2	--	--	--
2-6	3	--	--	--		14	--	--	--
6-10	1	--	--	--		6	--	--	--
10-17	3	2	0	--		4	2	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	--	2	9	1		--	5	15	2
25-35	--	7	10	0		--	20	21	0
35-45	--	7	8	0		--	13	13	0
45+	--	17	12	1		--	50	49	2
Adult	--	4	4	5		--	15	9	19

Table B39: Age and Sex Distribution of DISH in Urban Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
25-35	--	2	0	0		--	9	0	0
35-45	--	0	1	0		--	0	4	0
45+	--	18	3	0		--	100	15	0
Adult	--	1	1	0		--	5	5	0

Table B40: Age and Sex Distribution of DISH in Rural Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
25-35	--	1	0	0		--	5	0	0
35-45	--	0	0	0		--	0	0	0
45+	--	2	0	0		--	24	0	0
Adult	--	2	0	0		--	10	0	0

Table B41: Age and Sex Distribution of Maxillary Sinusitis in Urban Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	1	--	--	--
6-10	1	--	--	--
10-17	1	1	0	--
Juvenile	0	0	0	--
17-25	0	2	0	0
25-35	--	5	1	0
35-45	--	4	1	0
45+	--	4	0	0
Adult	--	2	1	0

Table B42: Age and Sex Distribution of Maxillary Sinusitis in Rural Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	1	--	--	--
6-10	0	--	--	--
10-17	0	0	0	--
Juvenile	0	0	0	--
17-25	0	0	2	0
25-35	--	0	0	0
35-45	--	0	1	0
45+	--	6	9	0
Adult	--	0	0	0

Table B43: Age and Sex Distribution of Non-Specific Infection in Urban Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	1	--	--	--		1	--	--	--
10-17	3	2	0	--		7	4	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	0	13	3	0		0	29	7	0
25-35	--	29	11	0		--	60	33	0
35-45	--	46	12	0		--	106	25	0
45+	--	37	11	1		--	97	25	1
Adult	--	16	13	20		--	70	31	45

Table B44: Age and Sex Distribution of Non-Specific Infection in Rural Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	2	--	--	--		2	--	--	--
2-6	2	--	--	--		2	--	--	--
6-10	0	--	--	--		0	--	--	--
10-17	3	0	0	--		1	0	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	0	3	6	0		0	9	17	0
25-35	--	1	7	0		--	3	19	0
35-45	--	4	5	0		--	11	10	0
45+	--	19	17	2		--	53	34	5
Adult	--	4	4	3		--	7	10	4

Table B45: Age and Sex Distribution of Osteoarthritis in Urban Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
17-25	0	3	4	1		0	3	4	0
25-35	--	9	3	0		--	18	3	0
35-45	--	24	4	0		--	38	5	0
45+	--	34	11	3		--	51	17	3
Adult	--	9	12	1		--	14	15	1

Table B46: Age and Sex Distribution of Osteoarthritis in Rural Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
17-25	0	0	4	0		0	0	6	0
25-35	--	3	5	0		--	7	15	0
35-45	--	5	8	0		--	7	24	0
45+	--	31	33	1		--	129	141	9
Adult	--	4	2	0		--	6	3	0

Table B47: Age and Sex Distribution of Rib Periostitis in Urban Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	2	--	--	--
6-10	1	--	--	--
10-17	0	0	0	--
Juvenile	0	0	0	--
17-25	0	1	0	0
25-35	--	4	0	0
35-45	--	1	0	0
45+	--	0	0	0
Adult	--	1	0	0

Table B48: Age and Sex Distribution of Rib Periostitis in Rural Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	0	--	--	--
6-10	0	--	--	--
10-17	0	0	0	--
Juvenile	0	0	0	--
17-25	0	0	0	0
25-35	--	1	0	0
35-45	--	1	0	0
45+	--	1	0	0
Adult	--	0	0	0

Table B49: Age and Sex Distribution of Trauma in Urban Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	0	--	--	--		0	--	--	--
10-17	2	0	0	--		4	0	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	0	0	0	0		0	0	0	0
25-35	--	3	4	0		--	3	5	0
35-45	--	7	2	0		--	8	2	0
45+	--	13	3	0		--	16	5	0
Adult	--	8	3	2		--	12	4	2

Table B50: Age and Sex Distribution of Trauma in Rural Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	0	--	--	--		0	--	--	--
10-17	0	0	0	--		0	0	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	0	0	1	0		0	0	1	0
25-35	--	0	1	0		--	0	1	0
35-45	--	2	1	0		--	2	1	0
45+	--	5	4	0		--	7	5	0
Adult	--	1	1	0		--	2	2	0

Older and Reform Orders

Table B51: Results of statistical test comparing older and reform orders

Health Indicator	**X^2**	**p**	**Higher rate/ Not significant**
Dental Calculus Corrected Prevalence Rate	0.21	0.65	Not significant
Dental Calculus Elements-wise Prevalence Rate	161.81	4.55E-37	Older
Dental Caries Corrected Prevalence Rate	0.00	0.99	Not significant
Dental Caries Elements-wise Prevalence Rate	0.26	0.61	Not significant
DISH Corrected Prevalence Rate	1.02	0.31	Not significant
DISH Elements-wise Prevalence Rate	8.95	2.78E-03	Older
Maxillary Sinusitis Corrected Prevalence Rate	18.50	1.70E-05	Reform
Non-Specific Infection Corrected Prevalence Rate	67.52	2.09E-16	Reform
Non-Specific Infection Elements-wise Prevalence Rate	149.23	2.55E-34	Reform
Osteoarthritis Corrected Prevalence Rate	0.25	0.61	Not significant
Osteoarthritis Elements-wise Prevalence Rate	1.47E-01	0.70	Not significant
Rib Periostitis Corrected Prevalence Rate	0.08	0.78	Not significant
Trauma Corrected Prevalence Rate	9.22	2.40E-03	Reform
Trauma Elements-wise Prevalence Rate	7.17	0.01	Reform

Table B52: Age and Sex Distribution of Dental Calculus in Older Orders Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	1	--	--	--		5	--	--	--
10-17	3	0	0	--		67	0	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	--	5	12	2		--	102	289	29
25-35	--	10	12	1		--	156	227	27
35-45	--	13	12	2		--	319	245	34
45+	--	11	5	1		--	209	34	19
Adult	--	4	9	2		--	61	116	38

Table B53: Age and Sex Distribution of Dental Calculus in Reform Orders Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	1	--	--	--		4	--	--	--
2-6	3	--	--	--		6	--	--	--
6-10	1	--	--	--		1	--	--	--
10-17	4	0	1	--		36	57	8	--
Juvenile	0	0	0	--		0	0	0	--
17-25	--	5	10	1		--	74	204	5
25-35	--	10	12	0		--	135	216	0
35-45	--	14	8	0		--	231	144	0
45+	--	29	29	2		--	396	324	8
Adult	--	3	1	2		--	13	3	15

Table B54: Age and Sex Distribution of Dental Caries in Older Orders Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	2	--	--	--		2	--	--	--
10-17	3	0	0	--		4	0	0	--
Juvenile	0	0	0	--		1	0	0	--
17-25	--	4	8	2		--	4	18	3
25-35	--	7	11	1		--	17	23	1
35-45	--	6	14	1		--	7	52	4
45+	--	15	2	4		--	22	4	5
Adult						--	13	9	10

Table B55: Age and Sex Distribution of Dental Caries in Reform Orders Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	3	--	--	--		4	--	--	--
2-6	4	--	--	--		19	--	--	--
6-10	2	--	--	--		7	--	--	--
10-17	4	2	0	--		4	2	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	--	3	5	0		--	7	9	0
25-35	--	11	9	0		--	28	24	0
35-45	--	17	5	0		--	32	7	0
45+	--	21	13	1		--	56	52	2
Adult	--	5	1	4		--	9	4	11

Table B56: Age and Sex Distribution of DISH in Older Orders Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
25-35	--	2	0	0		--	9	0	0
35-45	--	0	1	0		--	0	4	0
45+	--	6	0	0		--	33	0	0
Adult	--	0	0	0		--	0	0	0

Table B57: Age and Sex Distribution of DISH in Reform Orders Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
25-35	--	1	0	0		--	5	0	0
35-45	--	0	0	0		--	0	0	0
45+	--	14	3	0		--	91	15	0
Adult	--	3	1	0		--	15	5	0

Table B58: Age and Sex Distribution of Maxillary Sinusitis in Older Orders Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	0	--	--	--
6-10	0	--	--	--
10-17	0	0	0	--
Juvenile	0	0	0	--
17-25	0	0	1	0
25-35	--	0	0	0
35-45	--	0	0	0
45+	--	1	0	0
Adult	--	0	0	0

Table B59: Age and Sex Distribution of Maxillary Sinusitis in Reform Orders Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	2	--	--	--
6-10	1	--	--	--
10-17	1	1	0	--
Juvenile	0	0	0	--
17-25	0	2	1	0
25-35	--	5	1	0
35-45	--	4	2	0
45+	--	9	9	0
Adult	--	2	1	0

Table B60: Age and Sex Distribution of Non-Specific Infection in Older Orders Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	0	--	--	--		0	--	--	--
10-17	0	0	0	--		0	0	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	0	2	0	0		0	4	0	0
25-35	--	5	1	0		--	8	2	0
35-45	--	2	0	0		--	5	0	0
45+	--	12	0	1		--	21	0	1
Adult	--	4	5	5		--	4	9	11

Table B61: Age and Sex Distribution of Non-Specific Infection in Reform Orders Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	2	--	--	--		2	--	--	--
2-6	2	--	--	--		2	--	--	--
6-10	1	--	--	--		1	--	--	--
10-17	6	2	0	--		8	4	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	0	14	9	0		0	40	24	0
25-35	--	25	17	0		--	62	50	0
35-45	--	48	17	0		--	131	37	0
45+	--	44	28	2		--	136	69	5
Adult	--	16	12	18		--	39	31	38

Table B62: Age and Sex Distribution of Osteoarthritis in Older Orders Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
17-25	0	3	6	1		0	3	8	0
25-35	--	9	5	0		--	22	15	0
35-45	--	10	5	0		--	12	14	0
45+	--	19	5	3		--	40	11	3
Adult	--	6	10	1		--	9	14	1

Table B63: Age and Sex Distribution of Osteoarthritis in Reform Orders Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
17-25	0	0	2	0		0	0	2	0
25-35	--	3	3	0		--	3	3	0
35-45	--	19	7	0		--	33	15	0
45+	--	46	39	1		--	140	147	9
Adult	--	7	4	0		--	11	4	0

Table B64: Age and Sex Distribution of Rib Periostitis in Older Orders Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	0	--	--	--
6-10	0	--	--	--
10-17	0	0	0	--
Juvenile	0	0	0	--
17-25	0	0	0	0
25-35	--	1	0	0
35-45	--	0	0	0
45+	--	1	0	0
Adult	--	0	0	0

Table B65: Age and Sex Distribution of Rib Periostitis in Reform Orders Population

Corrected	J	M	F	U
0-2	0	--	--	--
2-6	2	--	--	--
6-10	1	--	--	--
10-17	0	0	0	--
Juvenile	0	0	0	--
17-25	0	1	0	0
25-35	--	4	0	0
35-45	--	2	0	0
45+	--	0	0	0
Adult	--	1	0	0

Table B66: Age and Sex Distribution of Trauma in Older Orders Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	0	--	--	--		0	--	--	--
10-17	0	0	0	--		0	0	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	0	0	1	0		0	0	1	0
25-35	--	0	1	0		--	0	1	0
35-45	--	0	0	0		--	0	0	0
45+	--	0	0	0					
Adult	--	3	3	2					

Table B67: Age and Sex Distribution of Trauma in Reform Orders Population

Corrected	J	M	F	U	Elements-wise	J	M	F	U
0-2	0	--	--	--		0	--	--	--
2-6	0	--	--	--		0	--	--	--
6-10	0	--	--	--		0	--	--	--
10-17	2	0	0	--		4	0	0	--
Juvenile	0	0	0	--		0	0	0	--
17-25	0	0	0	0		0	0	0	0
25-35	--	3	4	0		--	3	5	0
35-45	--	9	3	0		--	10	3	0
45+	--	18	7	0		--	23	10	0
Adult	--	6	1	0		--	10	2	0

Artefacts:

Nunneries and Monasteries

Table B67: Results of statistical tests comparing nunneries and monasteries

Artefact Class	**X^2**	**p**	**Higher rate/Not significant**
Dress Accessories	9.58	1.97E-03	Nunneries
Gaming	0.70	0.40	Not significant
Horse	5.72	0.02	Nunneries
Household	12.19	4.80E-04	Nunneries
Hygiene	39.16	3.91E-10	Monasteries
Jewellery	0.43	0.51	Not significant
Money	0.63	0.43	Not significant
Music	1.06	0.30	Not significant
Religious	22.01	2.71E-06	Monasteries
Textile	4.96E-03	0.94	Not significant
Timekeeping	1.61	0.20	Not significant
Tools/Industrial	27.13	1.91E-07	Monasteries
Weapons	1.06	0.30	Not significant
Writing/Reading	15.86	6.82E-05	Monasteries

Northern and Southern Houses

Table B68: Results of statistical tests comparing northern and southern houses

Artefact Class	**X^2**	**p**	**Higher rate/Not significant**
Dress Accessories	23.86	1.04E-06	Southern
Gaming	3.59	0.06	Not significant
Horse	8.85	2.94E-03	Southern
Household	1.95	0.16	Not significant
Hygiene	42.10	8.69E-11	Northern
Jewellery	1.88	0.17	Not significant
Money	9.27	2.20E-03	Northern
Music	0.86	0.35	Not significant
Religious	6.82	0.01	Northern
Textile	0.75	0.10	Not significant
Timekeeping	##	0.00E+00	Northern
Tools/Industrial	16.08	6.07E-05	Northern
Weapons	0.86	0.35	Not significant
Writing/Reading	5.10	0.02	Northern

Urban and Rural Houses

Table B69: Results of statistical tests comparing urban and rural houses

Artefact Class	**X^2**	**p**	**Higher rate/Not significant**
Dress Accessories	19.94	7.99E-06	Rural
Gaming	4.01	0.05	Urban
Horse	12.38	4.33E-04	Rural
Household	7.59	0.01	Rural
Hygiene	38.41	5.73E-10	Urban
Jewellery	4.37	0.04	Urban
Money	1.94	0.16	Not significant
Music	0.33	0.56	Not significant
Religious	22.03	2.69E-06	Urban
Textile	0.43	0.51	Not significant
Timekeeping	##	0.00E+00	Urban
Tools/Industrial	3.79	0.05	Urban
Weapons	3.79	0.05	Urban
Writing/Reading	5.10	0.02	Urban

Older and Reform Orders

Table B79: Results of statistical tests comparing older and reform orders

Artefact Class	**X^2**	**p**	**Higher rate/Not significant**
Dress Accessories	9.58	1.97E-03	Older
Gaming	0.70	0.40	Not significant
Horse	5.72	0.02	Older
Household	99.37	4.80E-04	Older
Hygiene	39.16	3.91E-10	Reform
Jewellery	0.43	0.51	Not significant
Money	0.63	0.43	Not significant
Music	1.06	0.30	Not significant
Religious	22.01	2.71E-06	Reform
Textile	4.96E-03	0.94	Not significant
Timekeeping	1.61	0.20	Not significant
Tools/Industrial	27.13	1.91E-07	Reform
Weapons	1.06	0.30	Not significant
Writing/Reading	15.86	6.82E-05	Reform

Table B80: Financial Evidence by House

	Elstow Abbey	Sinningthwaite Priory	Clementhorpe Priory	Nunnaminster Abbey	Hulton Abbey	St James' Priory	Priory of St Andrew	Hull Friary	**Totals**
Pensions									
Abbot/ Abbess	50.0.0	NA	NA	26.13.4	20.0.0	NA	NA		96.13.4
Prior/ Prioress	4.0.0	4.10.0	6.13.4	5.0.0		13.6.8	10.0.0		43.10.0
Total Pensions Granted	111.6.8		33.4.3	80.13.4			22.0.0		247.4.3
Total No. of Individuals	24	10	15	23		3-4?	4		79-80
Valuations									
Spirituals	185.4.5	2.0.0			20.10.0	55.7.4 listed as for both			264.1.9
Total Items (Spirituals)	27	1							28
Temporals	325.2.14	60.6.0	57.7.9		67.0.1 ½				509.17.0 ½
Total Items (Temporals)	18	22	12						52
Total Valuation (VE)	331.12.11	68.13.4	68.11.8	178.16.11 ¼	87.10.1 ½	35.6.8	47.14.3		818.2.10 ¾
Total Valuation (MA)	77.17.10	60.9.2	55.11.11	179.7.2	NA	NA	47.14.3		421.0.4

Valor Ecclesiasticus
Monasticon Anglicanum
Victoria County History

Appendix C: Results of individual sites

C.1 Priory of St Andrew Fishergate, York, North Yorkshire

Male; North; Urban; Reform Order

The Priory of St Andrew, York was founded in about 1200 with a grant from Hugh Murdac, Archdeacon of Cleveland. It was built near the nunnery of Clementhorpe, some of the buildings actually adjoining each other (VCH and Page and Page, 1974). St Andrew Fishergate was founded as part of the Order of Sempringham, an order founded by Gilbert of Sempringham in the middle of the twelfth century as an order for both sexes, who were intended to live in double houses, with separate living quarters, but worship together (Lawrence, 1989, p. 224-7). Priory of St Andrew, however, was never intended to be, nor ever was, a double house.

During the initial period of construction of the priory, the existing 11th century stone church was likely used until the construction was complete (Kemp and Graves, 1996, p. 323). In the late 13th or early 14th century there some minor modifications carried out on the cloister, with the church and eastern ranges being completely demolished and rebuilt on a smaller scale in the middle of the 14th century (*ibid.*). The speculation was that this downsizing was carried out as a response to the shrinking size of the community (Kemp and Graves, 1996, p. 323).

The archaeological data used in this section were collected from a series of publications reporting on the excavations as well as the original skeletal recording sheets (Kemp and Graves, 1996; Rogers, 1993; Stroud and Kemp, 1993; Stroud, 1986). These excavations focused on the church and the claustral buildings ahead of a development project. Due to the extensive nature of the development project, the majority of the precinct was excavated (Stroud and Kemp, 1993). A projected plan of the layout of the priory is below, see Figure C.1.

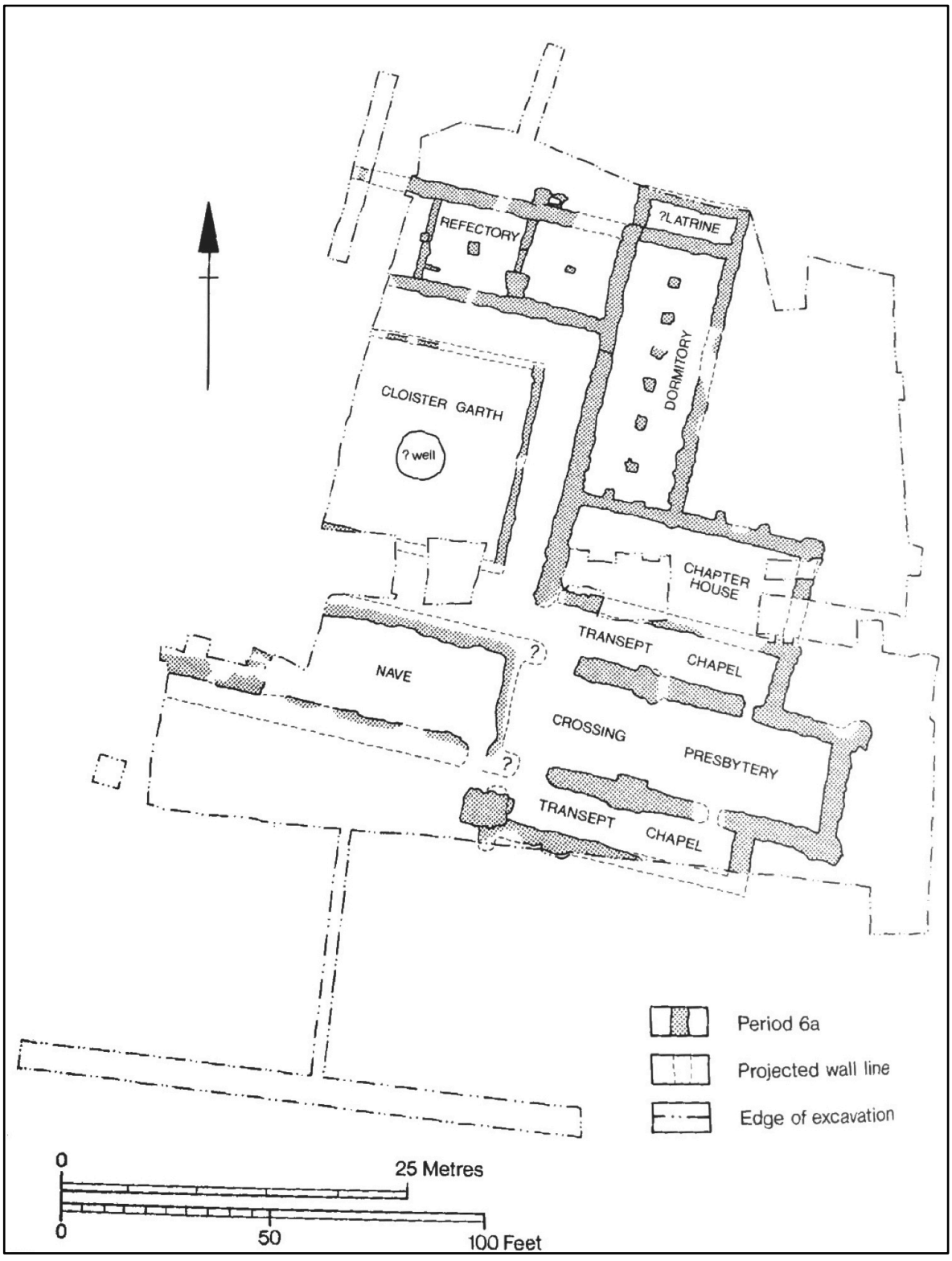


Figure C.1 Site plan for St Andrew's Priory (O'Connor, 1991, p. 218)

C.1.1 Burials

(i) Demography

Of the 402 individuals excavated at Priory of St Andrew, York, 391 have been included in this study, all of which were associated with the period of occupation of the priory. The remaining eleven were omitted because no complete inventory was found for those individuals. Figure C.2

shows the demography of the population, including the division of sex and age.

The male to female sex ratio of the 391 individuals is 2.44:1, or a little over double the males to females found. Only three individuals with unknown sex and 81 juveniles were identified. The high number of males in comparison to females is expected at a male monastic site.

The largest age group (120) is the Older group, representing those 45+ years of age, followed by the Middle Older (72) and Middle Younger (62) groups. The Adult age group has 46 individuals in it and the smallest adult age group, the Young Adult, has 12 individuals. The largest juvenile age group is the 10-17 year group with 27 individuals. It is followed by the 2-6 group, with 22 individuals, and then 0-2, with 20. The smallest juvenile age group is the 6-10 group with 10 individuals.

Considering the overwhelming majority of males at the site, it is unsurprising that males dominate the various age categories. The Adult category is the only one where the number of females is even remotely close to the number of males, with a ratio of roughly 4:3.

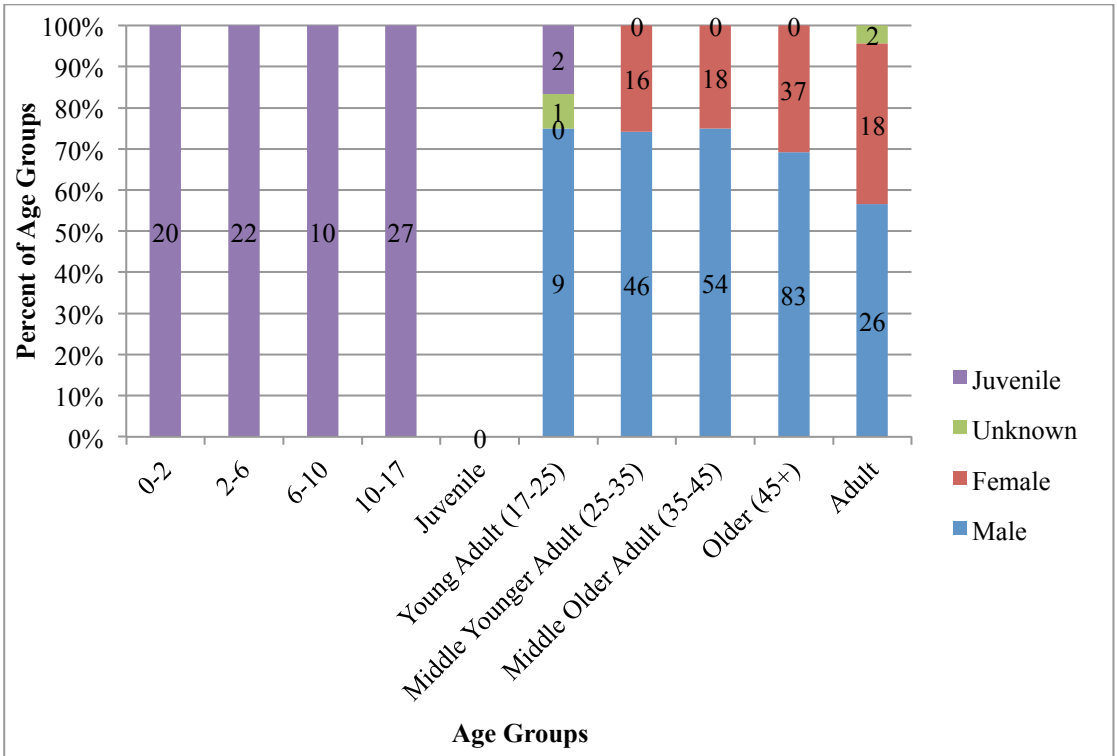


Figure C.2 Demography for St Andrew's Priory

(ii) Health Indicators

The health indicator that affected the most individuals (i.e. corrected prevalence) at Priory of St Andrew cemetery population was dental caries, affecting 26.0% (13) of individuals (Table C.1). Non-specific infection was second, affecting 10.7% (36) of individuals, followed by osteoarthritis with 8.7% (27). DISH (15) and trauma (26) affected 6% and 7.3% respectively, while rib periostitis

was recorded in just 2.1% (7) of the cemetery population. The least frequent health indicator was sinusitis, affecting less than 1% (1) of individuals.

Table C.1: Corrected Prevalence Rates for Priory of St Andrew

Health Indicator	Absent	Present	Percent Affected
Calculus	50	0	0.0%
Caries	37	13	26.0%
DISH	245	15	5.8%
Maxillary Sinusitis	241	1	0.4%
Non-specific Infection	301	36	10.7%
Osteoarthritis	285	27	8.7%
Rib Periostitis	322	7	2.1%
Trauma	332	26	7.3%

When the elements-wise prevalence rates are explored (Table C.2), the health indicator that affected the most skeletal or dental elements was non-specific infection, affecting 7.1% (120) of individuals followed by dental caries, affecting 5.4% (41) of teeth. DISH affected 1.5% (75) of all vertebrae. Evidence of trauma was found in 1.0% (32) of the long bones, while osteoarthritis was found in 0.7% (29) of joints. It is worth noting that, while calculus was originally recorded, the record of this did not survive in the archive.

Table C.2: Elements-wise Prevalence Rates for Priory of St Andrew

Health Indicator	Absent	Present	Percent Affected
Calculus	757	0	0.0%
Caries	716	41	5.4%
DISH	4913	75	1.5%
Non-specific Infection	1563	120	7.1%
Osteoarthritis	3859	29	0.7%
Trauma	3267	32	1.0%

The rates for caries in the St Andrew Fishergate cemetery population (Table C.3) show that more males than females are affected, but a lower percentage of their teeth. While 27.3% of males (6) were affected by caries, this accounted for only 4.1% of their teeth (15), while 25.0% of females (2) were affected and 10.9% of their teeth (16).

Table C.3 Age and Sex Distribution for Dental Caries: Corrected and Elements-wise Prevalence for Priory of St Andrew.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	2.0% (1)	--	--	--	1	0.3% (2)	--	--	--	2
2-6	2.0% (1)	--	--	--	1	0.7% (5)	--	--	--	5
6-10	2.0% (1)	--	--	--	1	0.1% (1)	--	--	--	1
10-17	4.0% (2)	0.0% (0)	0.0% (0)	--	2	0.3% (2)	0.0% (0)	0.0% (0)	--	2
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	-
25-35	--	2.0% (1)	2.0% (1)	0.0% (0)	2	--	0.7% (5)	1.7% (13)	0.0% (0)	18
35-45	--	4.0% (2)	0.0% (0)	0.0% (0)	2	--	0.3% (2)	0.0% (0)	0.0% (0)	2
45+	--	6.0% (3)	2.0% (1)	0.0% (0)	4	--	1.1% (8)	0.4% (3)	0.0% (0)	11
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Total	5	6	2	0	13	10	15	16	0	41

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

More males (12 or 6.5%) were affected by DISH (Table C.4), however, than females (3 or 4.0%). A higher percentage of their vertebrae were also affected (1.7% against 1.0%).

Table C.4 Age and Sex Distribution for DISH: Corrected and Elements-wise Prevalence for Priory of St Andrew.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
25-35	--	1.0% (1)	0.0% (0)	0.0% (0)	1	--	0.3% (5)	0.0% (0)	0.0% (0)	5
35-45	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
45+	--	9.7% (10)	1.9% (2)	0.0% (0)	12	--	3.1% (50)	6.1% (10)	0.0% (0)	50
Adult	--	1.0% (1)	1.0% (1)	0.0% (0)	2	--	0.3% (5)	0.3% (5)	0.0% (0)	10
Total	--	12	3	0	15	--	60	15	0	75

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Non-specific infection was recorded in 15.4% (32) of males and 12.2% (10) of females (Table

C.5). The most commonly affected bone was the tibia, where 75.6% (27) of all individuals were recorded with periostitis present.

Table C.5: Age and Sex Distribution for Non-Specific Infection Corrected and Elements-wise Prevalence for Priory of St Andrew.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	--	--	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	0.9% (2)	0.0% (0)	0.0% (0)	2	0.0% (0)	0.4% (6)	0.0% (0)	0.0% (0)	6
25-35	--	1.5% (5)	0.3% (1)	0.0% (0)	6	--	0.8% (13)	0.0% (0)	0.0% (0)	13
35-45	--	2.7% (9)	0.9% (2)	0.0% (0)	11	--	1.9% (32)	0.1% (2)	0.0% (0)	34
45+	--	4.2% (14)	1.2% (4)	0.0% (0)	18	--	2.3% (39)	0.7% (12)	0.0% (0)	51
Adult	--	0.9% (2)	0.9% (3)	0.0% (0)	5	--	3.0% (5)	0.7% (11)	0.0% (0)	16
Total	0	32	10	0	42	0	95	25	0	120

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The rates for osteoarthritis in the St Andrew Fishergate cemetery population are fairly evenly spread between the males and females, with 9% (8) of females being affected and 11.5% (25) of males (Table C.6). For both sexes, the area of the skeleton most affected was the vertebrae. The only evidence seen in females beyond the spine was seen in the hip and elbow joints. For the males, the knee followed by the hip was the second and third mostly commonly affected joint, with some hand/wrist, feet/ankle and elbow joints affected.

Table: C.6 Age and Sex Distribution for Osteoarthritis Corrected and Elements-wise Prevalence for Priory of St Andrew.

	Corrected Present				Elements-wise Present			
	M	F	U	T	M	F	U	T
17-25	0.0% (0)	0.0% (0)	0.0% (0)	0	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	0.0% (0)	0.0% (0)	0.0% (0)	0	0.0% (0)	0.0% (0)	0.0% (0)	0
35-45	1.3% (4)	0.6% (2)	0.0% (0)	6	0.1% (4)	0.1% (2)	0.0% (0)	6
45+	6.1% (19)	1.6% (5)	0.0% (0)	24	0.4% (16)	0.1% (3)	0.0% (0)	19
Adult	0.6% (2)	0.3% (1)	0.0% (0)	3	0.1% (4)	0.0% (0)	0.0% (0)	4
Total	25	8	0	33	24	5	0	29

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

No females at St Andrew Fishergate were recorded as having been affected by rib periostitis (Table C.7), but almost equal numbers of males and juveniles were affected, although this accounted for by a higher percentage of juveniles (4 or 2.2% of males and 3 or 4.4% of juveniles). Because of the way the number of ribs preserved at the site of St Andrew Fishergate was recorded, it is almost impossible to assess elements-wise prevalence rates, as discussed above.

Table: C.7 Age and Sex Distribution for Rib Periostitis: Corrected Prevalence for Priory of St Andrew.

	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0
2-6	0.6% (2)	--	--	--	2
6-10	0.3% (1)	--	--	--	1
10-17	0.0% (0)	--	--	--	0
Juvenile	0.0% (0)	--	--	--	0
17-25	--	0.3% (1)	0.0% (0)	0.0% (0)	1
25-35	--	0.6% (2)	0.0% (0)	0.0% (0)	2
35-45	--	0.0% (0)	0.0% (0)	0.0% (0)	0
45+	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Adult	--	0.3% (1)	0.0% (0)	0.0% (0)	1
Total	3	4	0	0	7

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Only one individual at St Andrew Fishergate was recorded with signs of sinusitis, a 35-45 female, affected in both maxillary sinuses.

Table C.8: Age and Sex Distribution for Trauma Corrected and Elements-wise Prevalence for Priory of St Andrew.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	--	0.8% (3)	0.3% (1)	0.0% (0)	4	--	0.1% (3)	0.0% (1)	0.0% (0)	4
35-45	--	1.1% (4)	0.3% (1)	0.0% (0)	5	--	0.2% (5)	0.0% (1)	0.0% (0)	6
45+	--	3.1% (11)	0.8% (3)	0.0% (0)	14	--	0.4% (13)	0.2% (5)	0.0% (0)	18
Adult	--	0.8% (3)	0.0% (0)	0.0% (0)	3	--	0.1% (4)	0.0% (0)	0.0% (0)	4
Total	0	21	5	0	26	-	25	7	0	32

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Males in the St Andrew Fishergate cemetery population were recorded as having been affected by trauma almost twice as often as the females, 9.7%% (21) versus 5.7%% (5) (Table C.8). The area most affected among females was the wrist, with five recorded bones affected. One female individual also had recorded fractures on her tibia and fibula.

The recorded trauma most common with the males was that of blade injuries. When the individuals with blade injuries are ignored, the males and females appear to have been affected in slightly different areas. Eight males sustained fractures to the arm or wrist, while 13 had fractures recorded to their legs or ankles.

C.1.2 Artefacts

The largest artefact class for the St Andrew Fishergate assemblage is the Dress Accessories class with 30% (57) of the total artefacts. It is followed closely by the Hygiene class with 20% (39) of the total. The Household class makes up 18% (35), and both Tools/Industrial (21) and Religious (21) make up 11%. The Textile class has 5% (9) of the total, Jewellery with 3% (5) and Weapons

make up the smallest percent with only 2% (3) of the total (Figure C.3).

The Dress Accessories class is made up of predominately pins, although there are a few buckles, straps ends and a single silver garment hook. The large Hygiene class is made up of fragments of combs, including blank connecting plates, suggesting that the priory or something in the vicinity was involved in comb production. The Household class is mostly made up of a variety of vessel fragments, as well a few keys and knives. The Tools/Industrial class is made up of quite a few rotary querns and a few crucibles, suggesting milling as well as metalwork. The Religious class is made up exclusively of glass beads, mostly likely rosary beads.

The Textile class is made up of spindle whorls and loom weights, while the Jewellery class is made up of a few rings, a brooch and a lead pendant. The Weapons class is made up of three sword fragments.

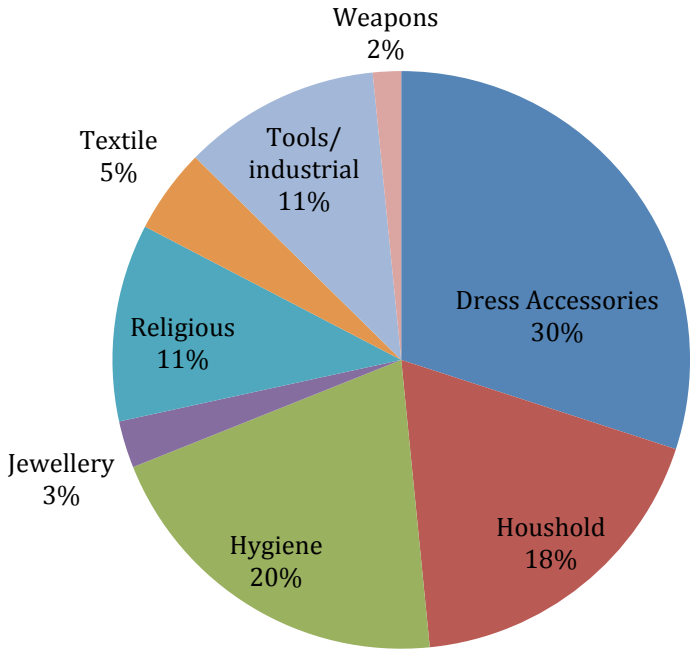


Figure C.3: Artefact Assemblage for St Andrew's Priory

When looking for artefacts that could indicate high status or income, both the artefact and the material are important. For example, beads and garment hooks by themselves are not high status or income indicators, but having glass beads and a silver garment hook could be. The other artefacts associated with Priory of St Andrew that could be indicative of high status or income are the three swords.

C.2.3 Documents

(i) Financial

Although the original foundation of the priory was for 12 individuals with the income from some urban properties amounting to 21 marks, the priory probably never reached that number of canons according to the VCH and Page and Page (1974). At the Dissolution, the clear income of the priory was £47 14s 3½ d, which supported 4 individuals, including the prior (Record Commission 1894; VCH and Page and Page, 1974). This income came from approximately 23 properties, all of which were in Yorkshire, including 7 manors and one urban property.

St Andrew Fishergate surrendered on 28 November 1538, and the prior was given £10 as a pension and the other three each given £4 (Record Commission 1894; VCH and Page and Page, 1974).

(ii) Lifestyle

Because St Andrew Fishergate was exempt from visitation, as were all those priories belonging to the Order of Sempringham, very little record remains of events within the priory (Kemp and Graves, 1996, p. 61-62). It is known that in 1280, 2 canons chose to leave the priory, much to the disgust of the remaining members, who wrote to the Pope asking for their excommunication, which was granted (Logan, 1996, p. 238; VCH and Page and Page, 1974). The prior was also called upon on a few occasions to sit on various committees for issues involving other religious houses in the area, including St Leonard's Hospital, York and the case of an apostate nun of Moxby nunnery who wanted to return (Kemp and Graves, 1996, p. 62). The prior also complained to the archbishop in 1486-7 regarding several men who had taken sanctuary within the priory walls. It would appear that several men working with the Sheriffs of York entered to arrest the men on charges of violence. As all priories of the Order of Sempringham had the right of sanctuary, Archbishop Rotherham admonished the Sheriffs and their men on behalf of the priory (VCH and Page and Page, 1974; Kemp and Graves, 1996, p. 62).

C.2 St Clement's Priory, York, North Yorkshire

Female; North; Urban; Older Order

St Clement's (Clementhorpe) Priory was founded between c.1125 and 1133, the earliest post-conquest nunnery to be established in Yorkshire (Dobson and Donaghey, 1984, p. 9). It was the only nunnery in Yorkshire to be founded near a town and solely by a member of the clergy, Archbishop Thurstan of York (*ibid.)*. At the Dissolution, it was recorded that Clementhorpe had an annual income of £57, securing its closure along with all other northern nunneries (Dobson and Donaghey, 1984, p. 26).

The archaeological data for this site were collected using the original excavation small finds recording book as well as the original skeletal recording sheets and an unpublished report by Jean

Dawes (Brinklow el al., 1977; Dawes, 1976-7; Clementhorpe Small Finds Register, 1986-7). The site itself had been considerably disturbed by both later buildings on the site of the nunnery and robber trenches (Brinklow el at., 1977). Due to the disturbance of the building remains, it was not possible to visualise the original ground plan of the priory or assess precisely which areas of the nunnery were excavated in relation to such a ground plan.

C.2.1 Burials

(i) Demography

The excavation of Clementhorpe Priory uncovered 163 individuals, 151 of which were included in this study, all of which were recorded as coming from "medieval" or "late medieval" contexts. No more exact dating was recorded. The 12 not included were omitted due to issues when data were collected from the original recording sheets, i.e. written comments being no longer visible or pages missing.

The demographic spread of these individuals can be found in Figure C.4 below, which presents both the sex distribution of the individuals and the ages.

The ratio of males to females within the Clementhorpe assemblage is approximately 1:2 (38:88). The largest age group is that of Adult (37), followed by the Middle Adult group (25-35 years at 35, and the Older Adult group (35-45) at 34. A similar distribution is seen in the age groups separated by sex, with females having 25 individuals in the Adult and Middle Adult groups and 24 in the Older Adult group, and males having 10 individuals in the Adult and Middle Adult groups and 9 in the Older Adult group.

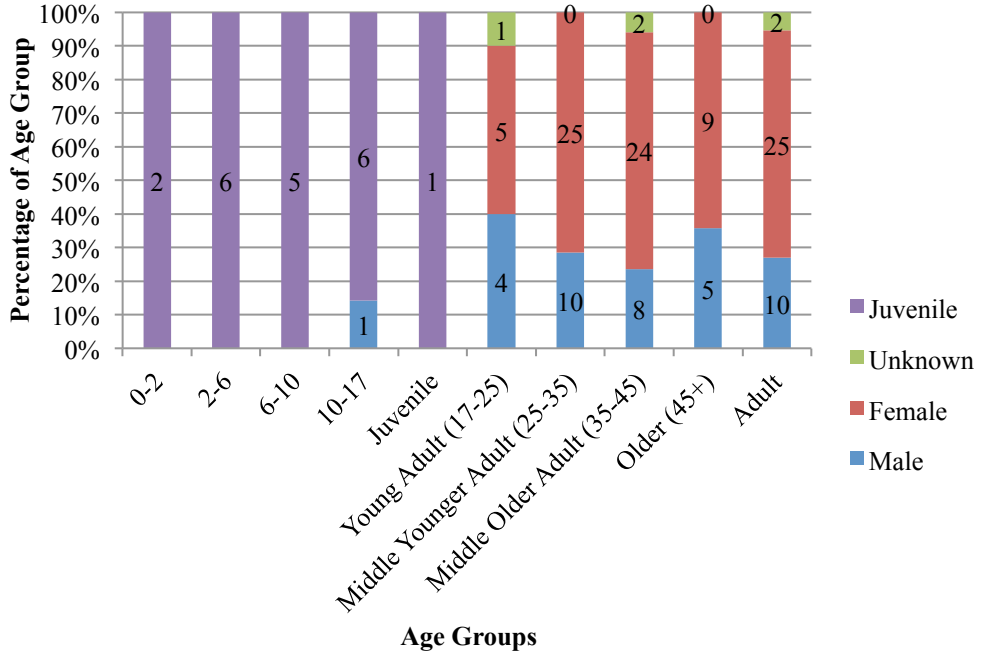


Figure C.4 Demography for Clementhorpe Priory

Those five individuals who could not be sexed were aged in the Adult (2), Older Adult (2) and Young Adult (1) age groups. The largest juvenile group is the 10-17 year age group (7), followed closely by 2-6 years (6) and 6-10 years (5). The youngest age group of 0-2 years had only two individuals, and the Juvenile group only one.

(ii) Health Indicators

The cemetery population at Clementhorpe was most predominantly affected by dental calculus and caries (Tables C.9 and C.10). Calculus affected 45.5% of the 99 individuals and 48.5% of all teeth. Caries were found in 28.3% of individuals and 5.1% of teeth. The health indicator next in frequency was osteoarthritis, affecting 13.1% of individuals. Evidence of both DISH and trauma were found, with DISH affecting only one individual (or 10.0% of the population and 3.1% of all vertebrae) and three individuals (2.8%) having been affected by some trauma.

Table C.9 Corrected Prevalence Rates for Health Indicators at Clementhorpe Priory

Health Indicator	Absent	Present	Percent Affected
Calculus	54	45	45.5%
Caries	71	28	28.3%
DISH	10	1	10.0%
Maxillary Sinusitis	99	0	0.0%
Non-specific Infection	90	0	0.0%
Osteoarthritis	113	17	13.1%
Rib Periostitis	8	0	0.0%
Trauma	104	3	2.8%

Table C.10 Elements-wise Prevalence Rates for Health Indicators at Clementhorpe Priory

Health Indicator	Absent	Present	Percent Affected
Calculus	775	730	48.5%
Caries	1428	77	5.1%
DISH	125	4	3.1%
Non-specific Infection	361	0	0.0%
Osteoarthritis	952	17	2.0%
Trauma	769	3	0.4%

The individuals with calculus recorded on their teeth are spread fairly evenly between males (16) and females (23), with only two juveniles and all five adults of undetermined sex being affected (Table C.11). When the percentages of the males and females affected are explored it is apparent that a higher percentage of males (59.3%) were affected by calculus than females (41.8%). For both males and females, the age group with the highest number of teeth affected was the 35-45 group. When elements-wise prevalence rates are examined, 61.4% (255) of the teeth of males and 44.2% (359) of female teeth were affect by calculus.

Table C.11 Age and Sex Distribution for Dental Calculus: Corrected and Elements-wise Prevalence for Clementhorpe Priory.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	2.0% (2)	--	--	--	2	2.9% (44)	--	--	--	44
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
17-25	--	3.0% (3)	2.0% (2)	1.0% (1)	6	--	3.5% (53)	2.3% (35)	1.5% (22)	110
25-35	--	4.0% (4)	6.1% (6)	0.0% (0)	10	--	3.3% (49)	6.6% (100)	0.0% (0)	149
35-45	--	5.1% (5)	8.1% (8)	2.0% (2)	15	--	7.4% (111)	11.3% (170)	2.3% (34)	315
45+	--	2.0% (2)	4.0% (4)	0.0% (0)	6	--	1.7% (26)	1.4% (21)	0.0% (0)	47
Adult	--	2.0% (2)	3.0% (3)	1.0% (1)	6	--	1.1% (16)	2.2% (33)	1.1% (16)	65
Total	2	16	23	4	45	44	255	359	72	730

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

A similar situation is seen with the individuals with carious lesions on their teeth (Table C.12). There were 19 females affected (34.5% of all females) and eight males (30.8% of all males), and only one individual of unknown sex (20%). The apparent similarity between the prevalence rates of caries in the males and females at Clementhorpe is less obvious when elements-wise prevalence rates are explored: 7.5% (61) for the female teeth, and only 2.7% (11) for the male teeth.

Table C.12 Age and Sex Distribution for Dental Caries: Corrected and Elements-wise Prevalence for Clementhorpe Priory.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
Juvenile	1.0% (1)	--	--	--	1	0.1% (1)	--	--	--	1
17-25	--	1.0% (1)	0.0% (0)	0.0% (0)	1	--	0.1% (1)	0.0% (0)	0.0% (0)	1
25-35	--	2.0% (2)	5.1% (5)	0.0% (0)	7	--	0.3% (4)	0.5% (8)	0.0% (0)	12
35-45	--	3.0% (3)	10.1% (10)	1.0% (1)	14	--	0.3% (4)	3.0% (45)	0.3% (4)	53
45+	--	2.0% (2)	2.0% (2)	0.0% (0)	4	--	0.1% (2)	0.3% (4)	0.0% (0)	6
Adult	--	0.0% (0)	2.0% (2)	0.0% (0)	2	--	0.0% (0)	0.3% (4)	0.0% (0)	4
Total	1	8	19	1	29	1	11	61	4	77

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

As with the previous health indicators, more males are affected by osteoarthritis than females, 29.7% (11) versus 7.9% (7) (Table C.13). For both males and females, a slightly higher number of individuals in the 35-45 and 45+ age groups are affected, but not significantly. The most commonly affected area was the spine with 14 individuals having some osteophyte formation and/or eburnation on their vertebrae. There were five individuals with osteoarthritis affecting their hip, and a single individual with the shoulder and ribs affected.

Table C.13 Age and Sex Distribution for Osteoarthritis: Corrected and Elements-wise Prevalence for Clementhorpe Priory.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
17-25	--	0.8% (1)	0.0% (0)	0.0% (0)	1	0.0% (0)	0.1% (1)	0.0% (0)	0.0% (0)	1
25-35	--	1.5% (2)	0.8% (1)	0.0% (0)	3	--	0.1% (1)	0.1% (1)	0.0% (0)	2
35-45	--	2.3% (3)	1.5% (2)	0.0% (0)	5	--	0.4% (4)	0.3% (3)	00.0% (0)	7
45+	--	2.3% (3)	1.5% (2)	0.0% (0)	5	--	0.2% (2)	0.1% (1)	0.0% (0)	3
Adult	--	1.5% (2)	1.5% (2)	0.0% (0)	4	--	0.2% (2)	0.2% (2)	0.0% (0)	4
Total	--	11	7	0	18	0	10	7	0	17

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The only individual affected by DISH was a female in the Older Adult (45+) age group (Table C.14).

Table C.14 Age and Sex Distribution for DISH: Corrected and Elements-wise Prevalence for Clementhorpe Priory.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
25-35	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
35-45	--	0.0% (0)	9.1% (1)	0.0% (0)	1	--	0.0% (0)	3.1% (4)	0.0% (0)	0
45+	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	00.0% (0)	0
Total	--	0	1	0	1	--	0	4	0	4

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The four individuals affected by trauma are two males (6.9%) in the Adult age group, a female in the 45+ group and another in the 25-35 age group (3.3%) (Table C.15). The two males sustained fractures, one in their left radius and the other in their right fibula. No note had been made about how well these fractures healed. The 45+ female had bilateral hip dysplasia and the 25-35 female sustained a fracture in her left tibia that was recorded as 'badly healed.'

Table C.15 Age and Sex Distribution for Trauma: Corrected and Elements-wise Prevalence for Clementhorpe Priory.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	--	--	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	0.0% (0)	0.0% (0)	0.0% (0)	0	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	--	0.0% (0)	0.9% (1)	0.0% (0)	1	--	0.0% (0)	0.1% (1)	0.0% (0)	1
35-45	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
45+	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Adult	--	1.9% (2)	0.0% (0)	0.0% (0)	2	--	2.6% (2)	0.0% (0)	0.0% (0)	2
Total	0	2	1	0	3	0	2	1	0	3

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

C.2.2 Artefacts

The largest group of artefacts found at Clementhorpe Priory (Figure C.5) fall into the Dress Accessories category, being made up primarily of pins, which could have been used to hold together clothing, including the wimple, characteristic of nuns. The next largest artefact class grouping is that of Household artefacts, made up of a range of vessel fragments and a few other food preparation items, such as a knife and a mortar. The Money category, made up of coins, is the third largest category, followed by Jewellery, made up of a combination of rings and clasps.

All of the rest of the categories have only two items, each making up 2% of the overall artefact assemblage. The Gaming category is made up of a domino and a draught or counter, the Textile category is made up of two needle fragments, Hygiene has two comb fragments, Religious has a bead and an amphora base, and in the Tool/Industry category there is an awl and a tang/ferrule, and the Writing/Reading category is made up of two bronze seal matrices.

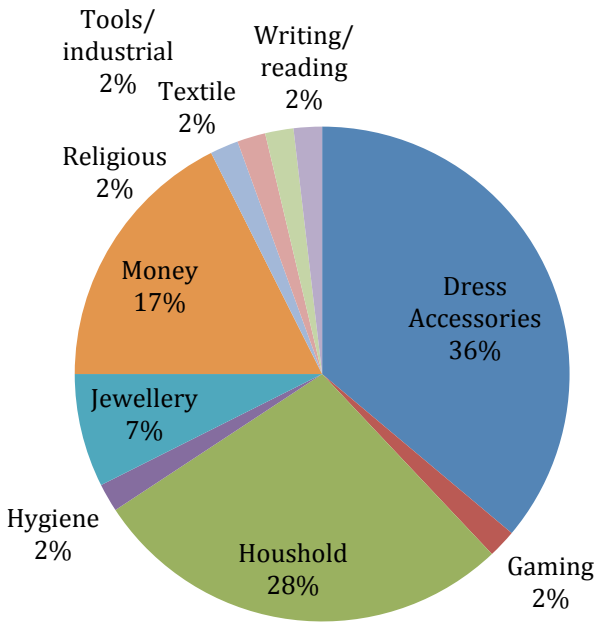


Figure C.5: Artefact Assemblage for Clementhorpe Priory

Out of a total of 108 artefacts, the only object that stands out as being of possible high status is that of a zoomorphic vessel lid (Artefact No. 153). The only artefact associated with a burial is that of a single bronze pin (Artefact No. 68) which was associated with the vertebrae of a male individual aged 45+ years (AS).

C.2.3 Documents

(i) Financial

When the priory was dissolved, the prioress was paid a pension of £6 13s 4d, part of the £33 4s 3d paid out to the 15 individuals who were granted pensions. The house as a whole was valued at £68 11s 8d (£57 7s 9d from the 12 listed temporals) from 37 listed temporals and spirituals, all of which were held in Yorkshire (Val Eccl and Monas Eccl). These included a church in Horton in Ribblesdale and another in Bishopthorpe as well as the church of St Clement, York. The priory also held 6 manors: Bigcroft, Horton in Ribblesdale; Clementhorpe, York; Dringhouses, York; Grimston, Dunnington; Middlethorpe, York; Monkhay, Bramham; York, York (Jurkowski and Ramsay, 2007b, p. 565). The lands held outside of York amounted to approximately 86 acres, bringing in £6 per year in Rent (Dobson and Donaghey, 1984, p. 20). It was the third wealthiest Yorkshire nunnery (Burton, 1979, p. 45).

The foundation of the Clementhorpe was two carucates, six perches, and two acres. These holdings were spread throughout the Yorkshire county. Its holdings were more widely scattered than other Yorkshire nunneries, and most of these endowments came from the middle classes, rather than the aristocracy (Dobson and Donaghey, 1984, p. 17-18). Although the nuns claimed insolvency in 1317 and were given indulgences to pay for repairs in 1442 and 1452, the nunnery was never

managed by a male *custos*, the nuns being allowed to manage their own finances (Dobson and Donaghey, 1984, p. 12-17). Dobson and Donaghey also suggest that the number of servants at Clementhorpe was lower than average when compared to other, small, Yorkshire nunneries (*ibid.)*.

(ii) Lifestyle

Although the nuns at Clementhorpe were in control of their own finances, there were a few times when an outsider had to be brought in to settle internal conflicts. In 1316 the election for the prioress became heated and split the nunnery into two factions. The dean of York, Robert Pickering, and the chancellor of the Minster, Robert Ripplingham, were brought in to settle the dispute. They annulled the election and appointed a third woman as prioress (Dobson and Donaghey, 1984, p. 13). A year later, during a visitation by Archbishop Melton, it was found that, although there was mostly due observance of the Rule, the nuns were indebting themselves by giving the local friars 14 loaves of bread every two weeks (Power, 1922, p. 122; VCH and Page and Page, 1974). He also found that the nuns were associating too much with the local secular women and reminded them that no outsiders, males, females or children, should be sleeping in the dormitory (VCH and Page and Page, 1974).

There were a few cases of nuns behaving in a scandalous manner. In the first part of the fourteenth century, three nuns were disciplined for having illicit relationships and a fourth was banned from ever holding office or leaving the nunnery walls for an unspecified offence (Dobson and Donaghey, 1984, p. 14-15). In 1324, the archbishop sent a commission to Clementhorpe to investigate 'defects' and the current prioress resigned (VCH and Page and Page, 1974). It is not clear if this investigation was brought on by the actions of the other four nuns. In 1300, a nun by the name of Cecily (surname unknown) "met men with saddled horse at priory gate and, throwing off her habit, rode with them…" she lived with a man by the name of Gregory de Thornton for three years (Logan, 1996, p. 257). At least two other nuns left Clementhorpe Priory in apostate, Joan de Leeds who was returned to the priory in 1318 and Isabel de Studley who was sent to Yedingham Priory in punishment for apostasy and other crimes in 1324. She returned to Clementhorpe in 1331 (Logan, 1996, p. 258).

During the visitation regarding dissolution, two nuns had already asked to be released from their vows. Dobson and Donaghey attribute this to the 'tumultuous events' leading up to the Dissolution, but do not discuss what these events were (1984, p. 14-15). All in all, Clementhorpe appears to have been a mostly well-managed priory, with the odd period of discord.

C.3 Elstow Abbey, Elstow, Bedfordshire

Female; South; Rural; Older Order

A woman named Judith, the niece of William the Conqueror (VCH and Page and Page, 1904),

founded Elstow Abbey at the end of the eleventh century. It was confirmed by Henry I in 1126 and considered a royal foundation from the thirteenth century (VCH and Page and Page, 1904). Many of the abbesses were daughters of baronial families or, towards the end of its existence, local gentry (*ibid.)*.

The original Saxon timber church that was located on the original site was not discovered during the course of the excavations, nor were the late 11th century temporary timber buildings of the nunnery itself (Baker, 1971, p. 57). The nunnery was constructed in stone in the 12th century, although the claustral buildings were rebuilt around the mid 14th century (Baker, 1971, p. 58-9). Additionally, there were at least nine major phases of updating, extensions, and limited rebuilding seen in the excavated remains of the church and claustral buildings (Baker, 1969, p. 290).

The abbey was involved in a variety of lawsuits throughout its history, with the abbesses asserting the rights over the town, surrounding areas and other monastic houses, including St Alban's Abbey, a house of Austin Canons, the monks at Newhouse and the brethren at the local St Leonard's Hospital (VCH and Page and Page, 1904). In several of these instances, it has been recorded, including by Matthew Paris, that the nuns behaved in an aggressive manner. A few of these disputes had to be settled by the Pope (VCH and Page and Page, 1904). Although there were a few periods when Elstow was not entirely financially stable, at the time of the Dissolution its income of £284 12s11d kept it out of the suppression of the smaller houses (VCH and Page and Page, 1904). The abbey was surrendered on 26 August 1539.

The extensive excavations carried out between 1968-72 uncovered much of the eastern arm of the church, the eastern claustral ranges, and several outbuildings to the south of the main complex (Baker, 1971). See site plan below, Figure C.5. The archaeological data for this site were collected using the Microsoft Excel spreadsheet of finds created by David Baker, along with copies of the original skeletal recording sheets by Ann Stirland (Baker ND a and b; Stirling ND).

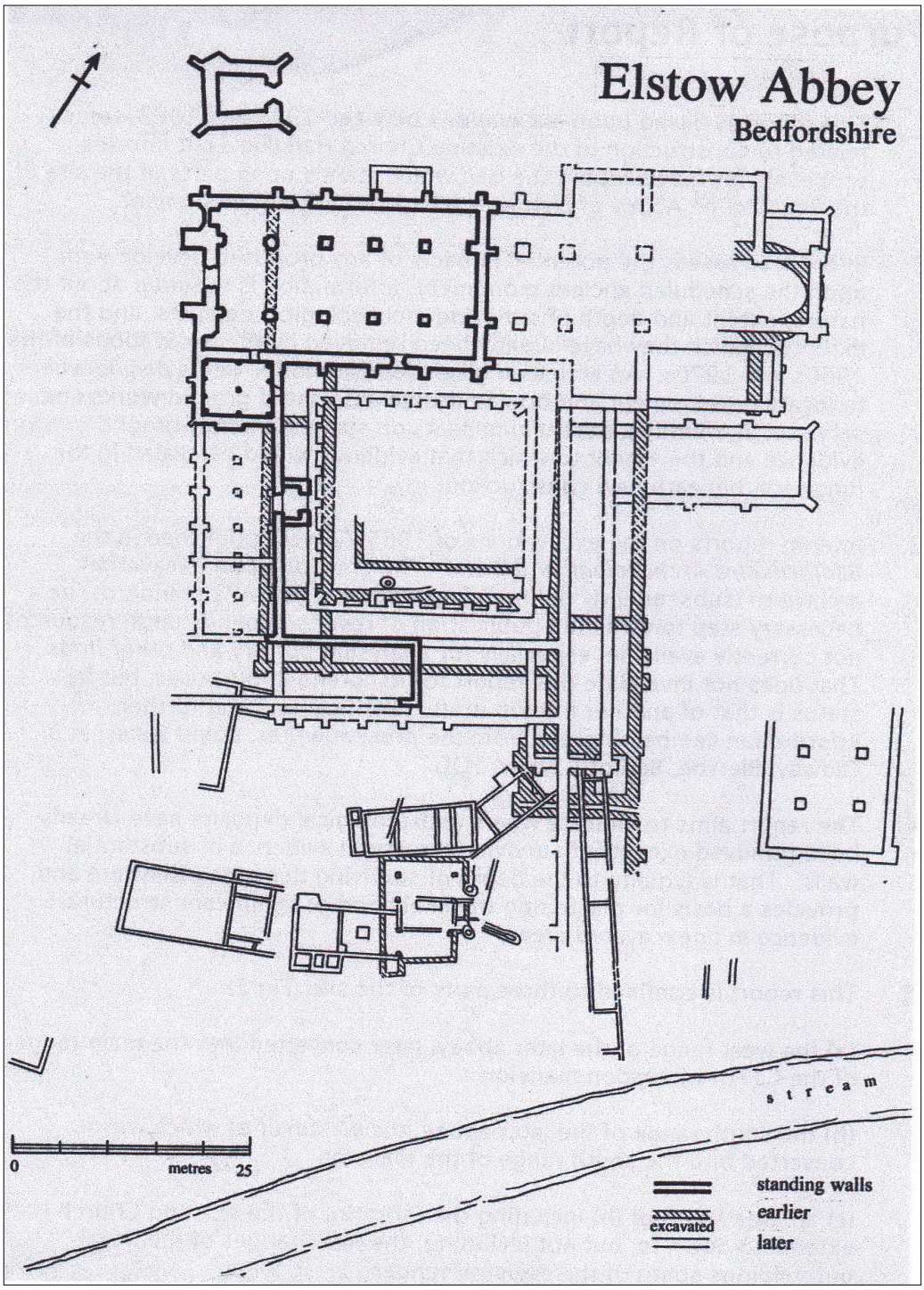


Figure C.6 Site plan of Elstow Abbey following 1968-72 excavations (Courtesy of D. Baker)

C.3.1 Burials

(i) Demography

Of the 90 individuals uncovered at Elstow Abbey, 45 were included in this study. As with the Clementhorpe burials, those individuals not included were omitted due to poor reproduction of original recording sheets. They were recorded only as "medieval," (as opposed to the large number of "Saxon" burials also uncovered). Within those 45 individuals were 17 females, five possible females, 12 males, three possible males, five adults of undetermined sex and three juveniles, giving

a sex ratio of 4.4:3 (22:15) females to male (Figure C.7). This higher number of females to males would be expected in a nunnery cemetery population.

The largest age category is the Adult (15 individuals) group, followed by Young Adult (9 individuals). The Middle Younger Adult group follows on with eight individuals and the Middle Older and Older groups each have five individuals. The juvenile age groups have two individuals in the 0-2 year group and one in the 10-17 group.

The adult age groups, with the exception of the Older and Adult groups, are dominated by females, with ratios of 7:1 Young Adults, 5:3 Middle Younger and 4:1 Middle Older. The Older age group has four males and one individual of unknown sex. The Adult age group is split virtually evenly between females (6), males (5) and adults of undetermined sex (4).

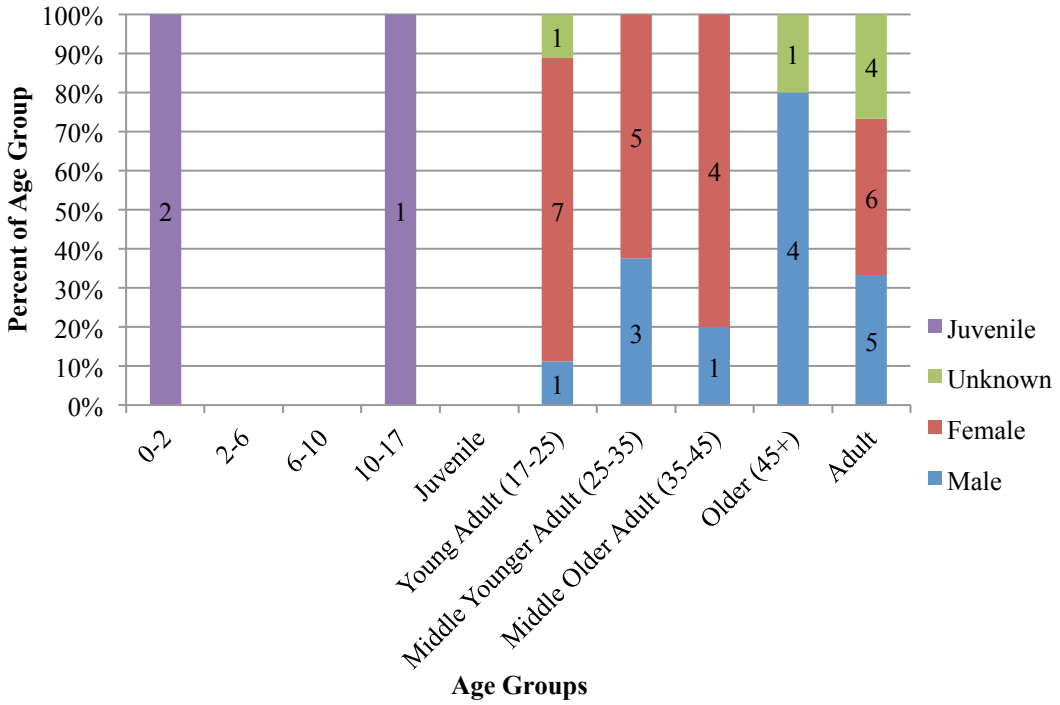


Figure C.7: Demography for Elstow Abbey

(ii) Health Indicators

The health indicator that affected the most individuals from Elstow Abbey was Caries, affecting 62.5% (25) of individuals but only 9.8% (68) of teeth, followed by Calculus, affecting 61.5% (24) of individuals and 70% (484) of teeth (Tables C.16 and C.17). Osteoarthritis affected 38.9% (16) of the cemetery population, making it the third largest indicator. The fourth was Non-Specific Infection at fourth with 14.3% (3) of the population, followed by Rib Periostitis at 7.7% (2) and Trauma, affecting 6.1% (2) of individuals. DISH was found in 9.5% (2) of the population and Sinusitis in 5.0% (2) of the population each. DISH only affected 2.7% (10) of vertebrae.

Table C.16: Corrected Prevalence Rates for Elstow Abbey

Health Indicator	Absent	Present	Percent Affected
Calculus	15	24	61.5%
Caries	15	25	62.5%
DISH	19	2	9.5%
Maxillary Sinusitis	38	2	5.0%
Non-specific Infection	18	3	14.3%
Osteoarthritis	26	16	38.9%
Rib Periostitis	24	2	7.7%
Trauma	31	2	6.1%

Table C.17: Elements-wise Prevalence Rates for Elstow Abbey

Health Indicator	Absent	Present	Percent Affected
Calculus	207	484	70.0%
Caries	623	68	9.8%
DISH	358	10	2.7%
Non-specific Infection	67	6	8.2%
Osteoarthritis	285	56	16.4%
Trauma	199	3	1.5%

The difference in calculus rates between the sexes is very clear, with 78.9% (15) of females being affected and only 46.2% (6) of males affected (Table C.18). When elements-wise prevalence rates are explored, the difference is even greater; 86.4% (323) of all the teeth of females are affected by calculus while only 50.0% (109) of the teeth of the males are affected.

Table C.18 Age and Sex Distribution for Dental Calculus Corrected and Elements-wise Prevalence for Elstow Abbey.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	2.6% (1)	--	--	--	1	3.3% (23)	--	--	--	23
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
17-25	--	0.0% (0)	10.3% (4)	2.6% (1)	5	--	0.0% (0)	16.5% (114)	1.0% (7)	121
25-35	--	5.1% (2)	12.8% (5)	0.0% (0)	7	--	5.4% (37)	14.3% (99)	0.0% (0)	136
35-45	--	2.6% (1)	10.3% (4)	0.0% (0)	5	--	2.7% (19)	10.9% (75)	0.0% (0)	94
45+	--	5.1% (2)	0.0% (0)	0.0% (0)	2	--	4.1% (29)	0.0% (0)	0.0% (0)	29
Adult	--	2.6% (1)	5.1% (2)	2.6% (1)	4	--	3.5% (24)	5.1% (35)	3.2% (22)	81
Total	1	6	15	2	24	23	109	323	29	484

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Prevalence rates for Caries show both a great difference between the sexes for both corrected and elements-wise prevalence rates (Table C.19). Corrected prevalence rates were 78.9% (15) for females and 50.0% (7) for males. However, 8.3% (31) of female teeth were affected as opposed to 11.5% (25) of male teeth.

Table C.19 Age and Sex Distribution for Dental Caries: Corrected and Elements-wise Prevalence for Elstow Abbey.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	2.5% (1)	--	--	--	1	0.3% (2)	--	--	--	2
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
17-25	--	2.5% (1)	10.0% (4)	2.5% (1)	6	--	0.1% (1)	0.9% (6)	0.3% (2)	9
25-35	--	2.5% (1)	12.5% (5)	0.0% (0)	6	--	0.7% (5)	2.0% (14)	0.0% (0)	19
35-45	--	2.5% (1)	7.5% (3)	0.0% (0)	4	--	0.1% (1)	0.9% (6)	0.0% (0)	7
45+	--	5.0% (2)	0.0% (0)	0.0% (0)	2	--	0.7% (5)	0.0% (0)	0.0% (0)	5
Adult	--	5.0% (2)	7.5% (3)	2.5% (1)	6	--	1.9% (13)	0.7% (5)	1.2% (8)	26
Total	1	7	15	2	25	2	25	31	10	68

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The only individuals affected by DISH in the Elstow Abbey population were male, two individuals in the age groups 25-35 and 45+ (Table C.20). Each had the minimum four vertebrae affected, making the overall elements-wise prevalence rate 2.8%.

Table C.20 Age and Sex Distribution for DISH: Corrected and Elements-wise Prevalence for Elstow Abbey.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
25-35	--	4.8% (1)	0.0% (0)	0.0% (0)	1	--	1.4% (5)	0.0% (0)	0.0% (0)	5
35-45	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
45+	--	4.8% (1)	0.0% (0)	0.0% (0)	1	--	1.4% (5)	0.0% (0)	0.0% (0)	5
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Total	--	2	0	0	2	--	10	0	0	10

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

All three individuals affected by non-specific infection within the Elstow Abbey cemetery population were female (Table C.21).

Table C.21 Age and Sex Distribution for Non-Specific Infection: Corrected and Elements-wise Prevalence for Elstow Abbey.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	--	--	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	0.0% (0)	0.0% (0)	0.0% (0)	0	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	--	4.8% (1)	4.8% (1)	0.0% (0)	2	--	0.0% (0)	2.7% (2)	0.0% (0)	2
35-45	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
45+	--	4.8% (1)	0.0% (0)	0.0% (0)	1	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Adult	--	0.0% (0)	9.5% (2)	0.0% (0)	2	--	0.0% (0)	5.5% (4)	0.0% (0)	4
Total	0	2	3	0	5	0	0	6	0	6

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

A roughly similar percentage of males and females within this population were affected by osteoarthritis: 40.0% (6) of males and 45.5% (10) of females (Table C.22).

Table C.22 Age and Sex Distribution for Osteoarthritis: Corrected and Elements-wise Prevalence for Elstow Abbey.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
17-25	--	0.0% (0)	7.1% (3)	0.0% (0)	3	0.0% (0)	0.0% (0)	1.5% (5)	0.0% (0)	5
25-35	--	2.4% (1)	7.1% (3)	0.0% (0)	4	--	1.5% (5)	3.8% (13)	0.0% (0)	18
35-45	--	2.4% (1)	7.1% (3)	0.0% (0)	4	--	0.6% (2)	3.2% (11)	0.0% (0)	13
45+	--	9.5% (4)	0.0% (0)	0.0% (0)	4	--	5.3% (18)	0.0% (0)	0.0% (0)	18
Adult	--	0.0% (0)	2.4% (1)	0.0% (0)	1	--	0.0% (0)	0.6% (2)	0.0% (0)	2
Total	--	6	10	0	16	0	25	31	0	56

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The only occurrence of rib periostitis at Elstow was in a 35-45 year old female, who was recorded as having four ribs with some kind of lesion on them (Table C.23).

Table C.23 Age and Sex Distribution for Rib Periostitis: Corrected and Elements-wise Prevalence for Elstow Abbey.

	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0
10-17	0.0% (0)	--	--	--	0
Juvenile	0.0% (0)	--	--	--	0
17-25	--	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	--	0.0% (0)	0.0% (0)	0.0% (0)	0
35-45	--	0.0% (0)	3.8% (1)	0.0% (0)	1
45+	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Total	0	0	1	0	1

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Table C.24 Age and Sex Distribution for Maxillary Sinusitis: Corrected and Elements-wise Prevalence for Elstow Abbey.

	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0
10-17	0.0% (0)	--	--	--	0
Juvenile	0.0% (0)	--	--	--	0
17-25	--	0.0% (0)	2.5% (1)	0.0% (0)	1
25-35	--	0.0% (0)	0.0% (0)	0.0% (0)	0
35-45	--	0.0% (0)	0.0% (0)	0.0% (0)	0
45+	--	2.5% (1)	0.0% (0)	0.0% (0)	1
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Total	0	1	1	0	2

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Maxillary sinusitis was only recorded in two individuals (Table C.24), a 17-25 year old female and a 45+ male. Both individuals were found to have sinusitis in both sinuses or bilateral sinusitis.

All of the individuals with recorded trauma were females (Table C.25). One had a healed fracture of the left tibia, another a dislocated first metacarpal, another had a shearing fracture of her right acromion (scapula) and the final one had sustained a fracture of her right radius and ulna.

Table C.25 Age and Sex Distribution for Trauma: Corrected and Elements-wise Prevalence for Elstow Abbey.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	--	--	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	0.0% (0)	3.0% (1)	0.0% (0)	1	0.0% (0)	0.0% (0)	0.5% (1)	0.0% (0)	1
25-35	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
35-45	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
45+	--	0.0% (0)	3.0% (0)	0.0% (0)	0	--	0.0% (0)	1.0% (0)	0.0% (0)	0
Adult	--	(0)	(1)	(0)	1	--	(0)	(2)	(0)	2
Total	0	0	2	0	2	0	0	3	0	3

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

C.3.2 Artefacts

As with most of the other sites in this study, the Dress Accessories artefact class is the largest (Figure C.8), making up 60% (263) of the total artefacts found at the site and is primarily composed of pins. The Household class is the next largest, with 24% (222) of the total, and is made up of a large number of vessel fragments. Following this the Household class has a large number of knives, blades and whetstones, as well as a fair number of keys and locks.

The other classes represented comprise around 0-5% of the total, with the Money class making up 5% (41), Textile 3%, and Jewellery (21) and Horse (19) each at 2%. Religious (9), Hygiene (8), Tools/Industrial (9) and Writing/Reading (4) all make up 1% of the total, while Music, Weapons and Gaming, with only three artefacts in each, register at less than 1% each.

The Money class is made up of coins and jettons, as well as a coin weight, a single lead ingot and a balancing arm for weighing coins and other items of value. The Textile class is made up of a mix of needle fragments, spindle whorls, loom weights and thimbles. Most of the jewellery found at Elstow comprised rings, although there was a copper alloy pendant and three brooches, one of which was made of gold. Elstow is the only nunnery to have any items in the Horse artefact class, which is made up of harness fittings, horseshoes, spurs and spur attachments.

The Religious class, unlike the other sites in this study, is predominately made up of bell fragments, rather than beads. The Hygiene class is made up of an equal number of tweezers and ear scoops, while the Tools/Industrial class is made of a mix of various gardening tools. The Writing/Reading class has two parchment prickers in it, as well as a seal handle and a single stylus.

The three artefacts making up the Weapons class are two arrowheads and a single ball shot. Within the Music class are two whistles and a tuning peg, while the Gaming class is made up of two marbles and a single die.

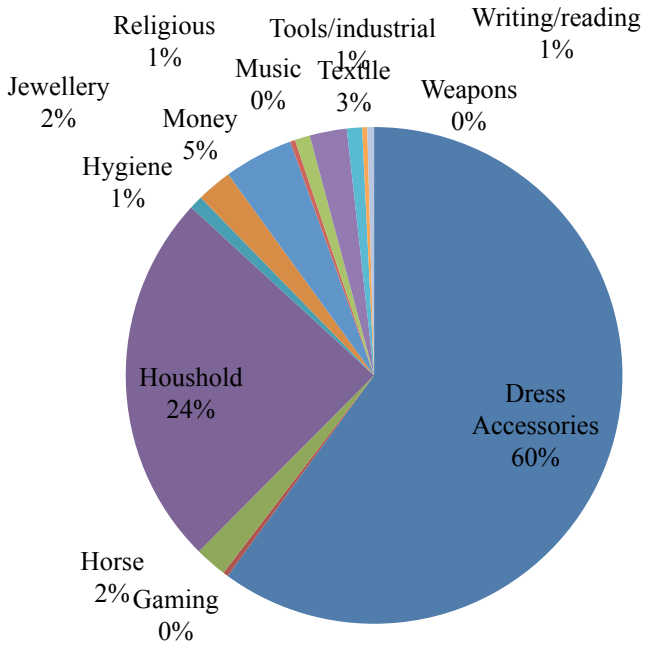


Figure C.8: Artefact Assemblage for Elstow Abbey

Most of the artefacts that could be considered indicative of high status or income were found within the Jewellery class, including gold and silver finger rings, a gold pendant and a gold brooch. The other two possible high status objects are a single glass button and a silver thimble. While neither of these artefacts is uncommon or particularly indicative of high status, the material of which they are made could be suggestive, just as with the previously discussed jewellery (Hinton, 2005; Egan, 1998, p. 265; Egan and Pritchard, 1991, p. 272-80).

C.4.3 Documents

(i) Financial

When the Domesday Book was written, Elstow Abbey was recorded as having 11.5 hides and 1½ virgates of land; in 1291 its income was recorded at £110. At the time of the Dissolution Elstow was recorded to hold a total of 34 properties over nine counties, including two chapels, 14 churches and three manors (Jurkowski and Ramsay, 2007a, p. 4). It was valued at £284 12s 11d (VCH and Page and Page, 1904).

The pensions paid out to the 24 individuals living at the house amounted to £111 6s 8d, including the £50 pension paid to the abbess Elizabeth Boyvill and the £4 pension granted to the prioress (Record Commission 1894; VCH and Page and Page, 1904). This £50 pension is the highest paid to an abbot or abbess of the eight monastic houses in this study, while the £4 is the lowest paid to a prior or prioress. The average pension granted to the other 22 individuals (approximately £2 10s) is only slightly higher than the average pension granted at Nunnaminster (£2 6s) and much higher than at Clementhorpe (£1). It is, however, lower than the average pension at St Andrew Fishergate, York (£4).

(ii) Lifestyle

Besides the variety of lawsuits mentioned above, the abbey of Elstow was frequently the subject of attention of local bishops. In 1270, a bishop named Gravesend, in a letter to his archbishop, wrote that he received more 'false reports of disgraceful acts' from Elstow than any other house, each report requiring him visiting the abbey and investigating the accusations (VCH and Page and Page, 1904). In 1300, the Pope put Elstow, along with several other houses, under an order of enclosure.

Throughout the fourteenth century, Elstow is chastised by various bishops for not adhering to this order, as well as fraternising with secular people and the monks and canons in the surrounding area (VCH and Page and Page, 1904). In 1387, Bishop Buckingham wrote that the nuns' behaviour with the monks and canons could render them unsuitable for the 'marriage chamber of the Heavenly Bridegroom' and that they should remain within the nunnery precinct (*ibid.)*. There was only one recorded apostasy at Elstow Abbey, however, with a nun from the family Pernell being reported at an episcopal visitation in 1432.

Another frequent criticism of Elstow was that they were not carrying out their duties or the church offices properly. The injunctions of Bishop Longland in 1530 suggest that the house was no longer performing full offices and was 'thoroughly secularised,' citing the inclusion of the abbess' servants in religious processions (VCH and Page and Page, 1904).

C.4 Hull Austin Friary, Kingston-upon-Hull, Yorkshire

Male; North; Urban; Reform Order

In 1317 a license was granted by the King to allow a house of Austin Friars to be built in Hull, Yorkshire. The Austin Friars in York sent some of their members to found the house, which was endowed by Geoffrey de Hotham and John de Wetwang (VCH and Page and Page, 1974). The friars had to pay rent of 16s8d to the town for the land that their house was built on until 1341 when their 1321 petition was granted to be released from it (*ibid.)*. Unlike the other religious houses included in this study, the Hull Austin Friary was built predominately out of brick, owing to

the later date of foundation and the fact that the city of Hull had a large brick making industry (Evans, 1998, p. 25).

The site was excavated in preparation for the construction of the new magistrate's court, as such the excavation report refers to the site as the Hull Magistrate's Court (Evans ND a and b). The excavation uncovered parts of the church, specifically parts of the nave, choir, and chapel, as well as parts of the eastern and western range, and the cloister (Evans, 1998). The archaeological data for this site were collected using the artefact database developed by David Evans, the original skeletal recording sheets created by Lynda Isaac, and the pathology recording sheets created by Malin Holst (Evans ND a and b; Holst, 1998; Isaac, 1998).

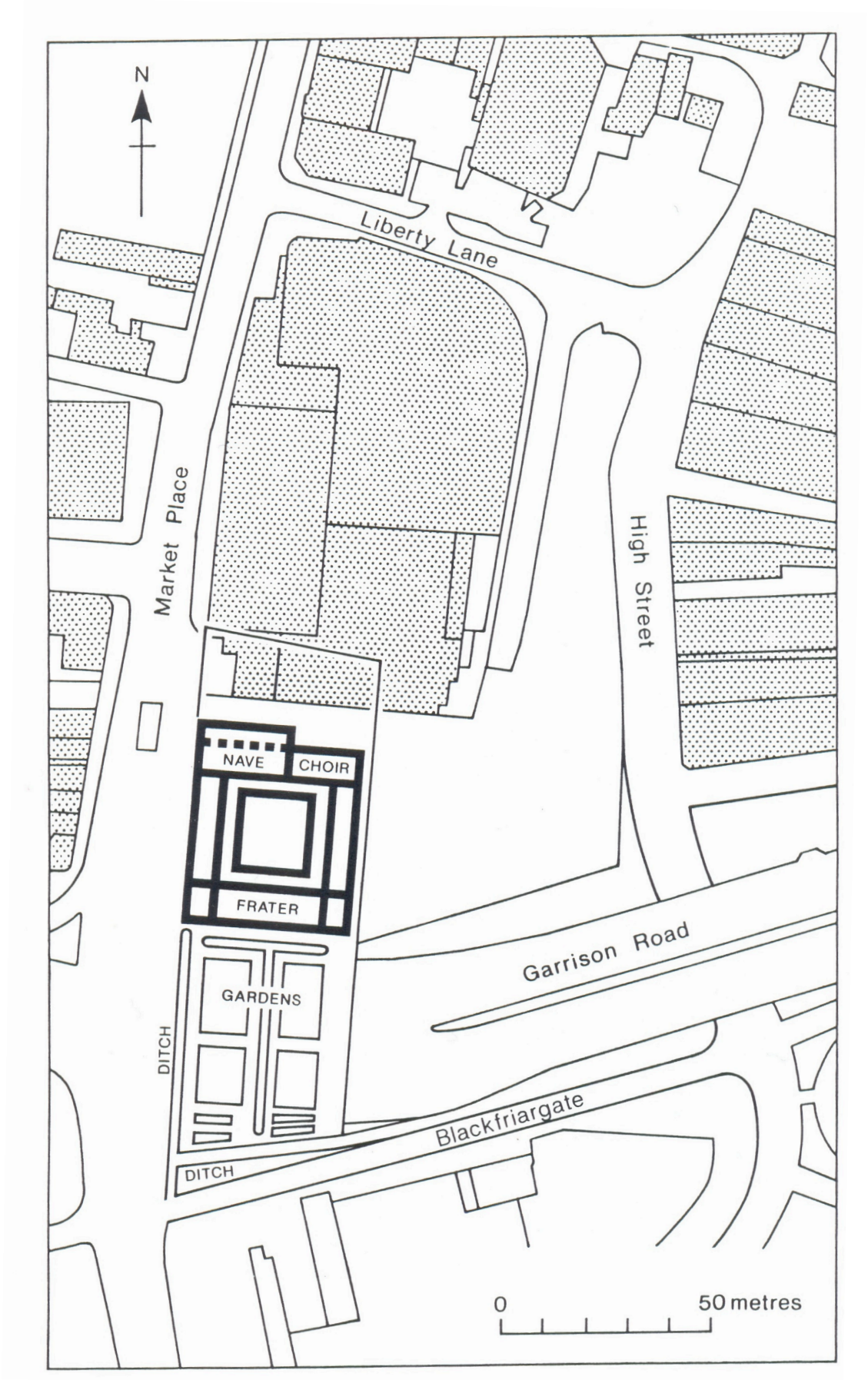


Figure C.9: Site plan for Hull Austin Friary (Evans ND, Figure 3)

C.4.1 Burials

(i) Demography

The excavation at Hull Austin Friary uncovered 249 individuals, 106 males, 40 possible males, 20 adults of undetermined sex, 20 possible females, 37 females and 26 juveniles (Figure C.10). This equates to a sex ratio of approximately 2.5:1, a figure in keeping with a male monastic house. The period recorded against these remains was "Med [Medieval] Austin Friary."

The largest age category is the Middle Older Adult group with 64 individuals represented, followed by the Adult category with 55 individuals and the Middle Younger Adult group with 51. The Older Adult category has 27 individuals in it and the Younger Adult has 22 individuals. The largest Juvenile category is the 10-17 year age group with 17 individuals, followed by the 2-6 year age group with four. The other three groups, 0-2, 6-10 and Juvenile each have three individuals.

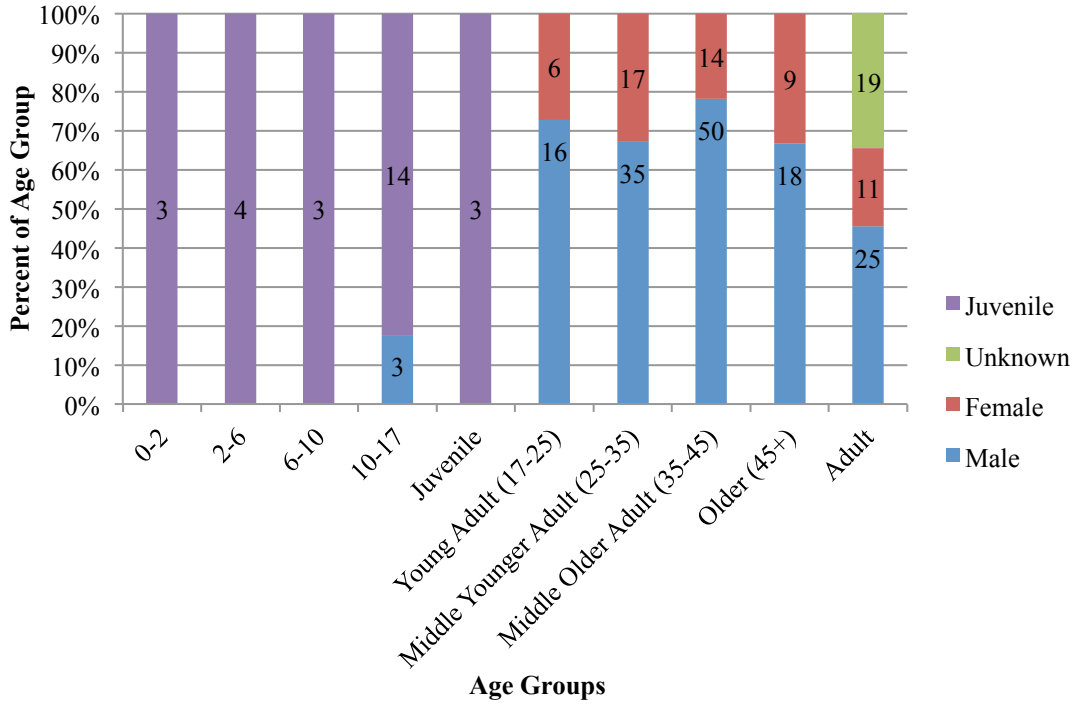


Figure C.10: Demography for Hull Austin Friary

Although the males outnumber the females in every adult age category, the representation of the groups is approximately similar, with the exception of the Middle Older Adult group. In the Young Adult group, both sexes comprise only about 10% of their total individuals. In the Middle Younger Adult group, both have approximately 25%, with the Older just over 1%, and the Adult between 17-20%. Within the Middle Older Adult category, however, the males comprise approximately 34% of the total while the females comprise only 25%.

(ii) Health Indicators

The health indicator that affected the largest percentage of the Hull Austin Friary cemetery

population was Non-Specific Infection (148 or 67.0% of individuals). Maxillary Sinusitis had the second highest frequency (23 or 16.4%), followed closely by Dental Caries (24 or 16.2%), Osteoarthritis (24 or 12.8%), and Trauma (13 or 5.5%). Calculus affected only 4.7% (7) of the population, while DISH affected 2.5% (4) and Rib Periostitis only 1.6% (3) (Tables C.26 and C.27).

Table C.26 Corrected Prevalence Rates for Hull Austin Friary

Health Indicator	Absent	Present	Percent Affected
Calculus	142	7	4.7%
Caries	124	24	16.2%
DISH	157	4	2.5%
Maxillary Sinusitis	117	23	16.4%
Non-specific Infection	73	148	67.0%
Osteoarthritis	193	24	12.8%
Rib Periostitis	186	3	1.6%
Trauma	224	13	5.5%

Non-Specific Infection was recorded on approximately one third of all surviving leg bones. Following far behind was Calculus (74 or 2.4% of teeth), Osteoarthritis was recorded on 1.8% of joint surfaces (47) and Dental Caries on 1.4% (43) of teeth. Both DISH (27) and Trauma (20) were found to have affected less than 1% of the surviving relevant elements.

Table C.27 Elements-wise Prevalence rates at Hull Austin Friary

Health Indicator	Absent	Present	Percent Affected
Calculus	3034	74	2.4%
Caries	3065	43	1.4%
DISH	2858	27	0.9%
Non-specific Infection	753	378	33.3%
Osteoarthritis	2551	47	1.8%
Trauma	2218	20	0.9%

Although far more males were recorded as having being affected by non-specific infection (Table C.28), a slightly lower percentage of males were affected than females, 71.4% (90) in comparison with 75.0%% (39). The adults of undetermined sex are affected more (15 or 73.8%%). Only 14.8%% (4) of juveniles were recorded with evidence of non-specific infection.

Table C.28 Age and Sex Distribution for Non-Specific Infection: Corrected and Elements-wise Prevalence for Hull Austin Friary.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.5% (1)	--	--	--	1	0.08% (1)	--	--	--	1
10-17	1.4% (3)	9.0% (2)	--	--	5	0.6% (7)	0.4% (4)	0.0% (0)	--	11
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	4.5% (10)	1.4% (3)	0.0% (0)	13	0.0% (0)	2.2% (25)	0.6% (7)	0.0% (0)	32
25-35	--	9.0% (20)	5.0% (11)	0.0% (0)	31	--	4.1% (46)	2.9% (33)	0.0% (0)	79
35-45	--	15.8% (35)	5.0% (11)	0.0% (0)	46	--	7.8% (88)	2.2% (25)	0.0% (0)	113
45+	--	5.9% (13)	3.2% (7)	0.0% (0)	20	--	3.9% (44)	2.0% (23)	0.0% (0)	67
Adult	--	4.5% (10)	3.2% (7)	6.8% (15)	32	--	2.4% (27)	1.2% (14)	2.0% (34)	75
Total	4	90	39	15	148	8	234	102	34	378

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

A higher percentage of females than males were affected by osteoarthritis (12 or 21.1% of females, 20 or 14.2% of males) (Table C.29). The joint most frequently involved in females was the hip, followed by the wrist or hand. In males, the shoulder was the most frequently involved, followed by the hip and then the knee and the wrist or hand.

Table C.29 Age and Sex Distribution for Osteoarthritis: Corrected and Elements-wise Prevalence for Hull Austin Friary.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	
17-25	--	0.0% (0)	0.5% (1)	0.0% (0)	1	0.0% (0)	0.0% (0)	0.03% (1)	0.0% (0)	1
25-35	--	0.5% (1)	0.9% (2)	0.0% (0)	3	--	0.03% (1)	0.03% (1)	0.0% (0)	2
35-45	--	5.5% (12)	1.4% (3)	0.0% (0)	15	--	0.9% (24)	0.0% (0)	0.0% (0)	24
45+	--	1.8% (4)	1.4% (3)	0.0% (0)	7	--	0.5% (13)	0.1% (3)	0.0% (0)	16
Adult	--	1.4% (3)	1.4% (3)	0.0% (0)	6	--	0.03% (1)	0.1% (3)	0.0% (0)	4
Total	--	20	12	0	32	--	39	8	0	47

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

A similar percentage of males were affected by trauma as females (19 or 14.0% versus 8 or 14.3%), and for the most part both sexes were affected by trauma in similar bones: tibiae, fibulae, clavicles, ribs, ulnae and radii (Table C.30). A few of the males, however, had recorded fractures on their humeri and/or scapulae. The other, more major, difference is that three males had recorded trauma of their skulls, including one blade injury and another who had nine wounds to the skull.

Table C.30 Age and Sex Distribution for Trauma: Corrected and Elements-wise Prevalence for Hull Austin Friary.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.8% (2)	--	--	--	2	0.2% (4)	0.0% (0)	0.0% (0)	--	4
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	0.0% (0)	0.4% (1)	0.0% (0)	1	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	--	1.3% (3)	1.3% (3)	0.0% (0)	6	--	0.0% (0)	0.1% (3)	0.0% (0)	3
35-45	--	3.0% (7)	0.8% (2)	0.0% (0)	9	--	0.1% (3)	0.04% (1)	0.0% (0)	4
45+	--	0.8% (2)	0.0% (0)	0.0% (0)	2	--	0.1% (3)	0.0% (0)	0.0% (0)	3
Adult	--	3.0% (7)	0.8% (2)	0.0% (0)	9	--	0.2% (4)	0.09% (2)	0.0% (0)	6
Total	2	19	8	0	29	4	10	6	0	20

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

A higher percentage of males than females was affected by carious lesions (21 or 20.8% versus 3 or 8.6%%) (Table C.31). This is also seen in the elements-wise prevalence rates (39 or 1.8% of male teeth, and 4 or 0.5% of female teeth).

Table C.31 Age and Sex Distribution for Dental Caries: Corrected and Elements-wise Prevalence for Hull Austin Friary.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
17-25	--	1.4% (2)	0.0% (0)	0.0% (0)	2	--	0.1% (3)	0.0% (0)	0.0% (0)	3
25-35	--	2.7% (4)	2.0% (3)	0.0% (0)	7	--	0.3% (8)	0.1% (4)	0.0% (0)	12
35-45	--	6.1% (9)	0.0% (0)	0.0% (0)	9	--	0.6% (18)	0.0% (0)	0.0% (0)	18
45+	--	2.0% (3)	0.0% (0)	0.0% (0)	3	--	0.1% (3)	0.0% (0)	0.0% (0)	3
Adult	--	2.0% (3)	0.0% (0)	0.0% (0)	3	--	0.2% (7)	0.0% (0)	0.0% (0)	7
Total	0	21	3	0	24	0	39	4	0	43

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Similarly, maxillary sinusitis was recorded in 19.4% (18) of the males and only 0.6% (2) of females (Table C.32). No adults of undetermined sex were recorded with sinusitis, but 21.4% of juveniles were affected.

Table C.32 Age and Sex Distribution for Maxillary Sinusitis: Corrected and Elements-wise Prevalence for Hull Austin Friary.

	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0
2-6	0.7% (1)	--	--	--	1
6-10	0.7% (1)	--	--	--	1
10-17	0.7% (1)	0.7% (1)	--	--	2
Juvenile	0.0% (0)	--	--	--	0
17-25	--	1.4% (2)	0.0% (0)	0.0% (0)	2
25-35	--	3.6% (5)	0.7% (1)	0.0% (0)	6
35-45	--	2.9% (4)	0.0% (0)	0.0% (0)	4
45+	--	2.9% (4)	0.0% (0)	0.0% (0)	4
Adult	--	1.4% (2)	0.7% (1)	0.0% (0)	3
Total	3	18	2	0	23

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Unlike most of the other sites in this study, the Calculus health indicator affected a fairly small percentage of the total population (5 or 4.9% of males and 1 or 2.8% of females, and 70 or 3.3% of male teeth and 4 or 0.5% of female teeth) (Table C.34).

Table C.34 Age and Sex Distribution for Dental Calculus: Corrected and Elements-wise Prevalence for Hull Austin Friary.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
Juvenile	(0)	--	--	--	0	(0)	--	--	--	0
17-25	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	--	0.7% (1)	0.7% (1)	0.0% (0)	2	--	0.1% (3)	0.1% (4)	0.0% (0)	7
35-45	--	2.0% (3)	0.0% (0)	0.0% (0)	3	--	1.1% (35)	0.0% (0)	0.0% (0)	35
45+	--	0.7% (1)	0.0% (0)	0.0% (0)	1	--	1.0% (32)	0.0% (0)	0.0% (0)	32
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0 (0)	0
Total	0	5	1	0	6	0	70	4	0	74

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

DISH affected 2.8% (3) of males and 1.1% (22) of their vertebrae (Table C.35). Females were similarly affected, with 2.1% (1) of individuals affected and 0.6% (5) of their vertebrae.

Table C.35 Age and Sex Distribution for DISH: Corrected and Elements-wise Prevalence for Hull Austin Friary.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
25-35	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
35-45	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
45+	--	1.5% (3)	0.5% (1)	0.0% (0)	4	--	0.6% (22)	0.1% (5)	0.0% (0)	27
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Total	--	3	1	0	4	--	22	5	0	27

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The only individuals affected by Rib Periostitis at Hull Austin Friary were males, three individuals with a total of ten ribs being affected; two were in the age group 25-35 and the other was in the 34-45 age group. Without a more effective count of the total number of ribs present within the cemetery population it is not possible to generate a elements-wise prevalence rate.

C.4.2 Artefacts

As with most of the other sites in this study, the largest artefact class in the Hull Austin Friars' assemblage is that of Dress Accessories, making up 58% (255) of the total (Figure C.11). The Household class is the next largest with 17% (75), but after this the numbers decline fairly significantly. The Money class is 7% (28) of the total and both the Writing/Reading (16) and Religious (15) classes make up 4%, while the Jewellery (13) class is at 3%. Both the Textile (8) and the Tools/Industrial (8) classes make up 2% of the total and the Music (4), Hygiene (6), Horse (2) and Gaming (6) classes hold 1% of the total. The Weapons (1) class made up less than 1%. Although Buckles make up a fair percentage of the total artefacts in the Dress Accessories class, the largest contributor is fragments of shoes. Because of the nature of the soil at the Hull Friars' site, a large collection of leather shoe fragments were preserved and these far outnumber the other artefacts in the Dress Accessories class. The Household class is primarily made up of vessel and plate fragments, although there are quite a few whetstones and knives included. The Money class, unsurprisingly, is made up of mostly coins and a few jettons. The Writing/Reading class is predominantly made up of styli and pens, although there are also two seals and two book clasps. The Religious class is primarily comprised of beads, although there are two jet crucifixes, a bell and a papal bull seal. The Jewellery class contains exclusively rings. The Textile class is made up of a mix of needles and spindle whorls, as well as one copper alloy thimble. The Tools/Industrial class is containing a mix of tools, including an awl, a chisel, a fishing-weight and a hammerhead. The Music class has of three tuning pegs and a bone flute. The Hygiene class is made up of a comb, a shaving brush, an ear scoop, two toothbrushes and a ferrule, an object used in bloodletting. The Horse category contains a horseshoe and a spur while the Gaming class is made up of six stone or ceramic gaming pieces. The final class, Weapons, has a single scabbard.

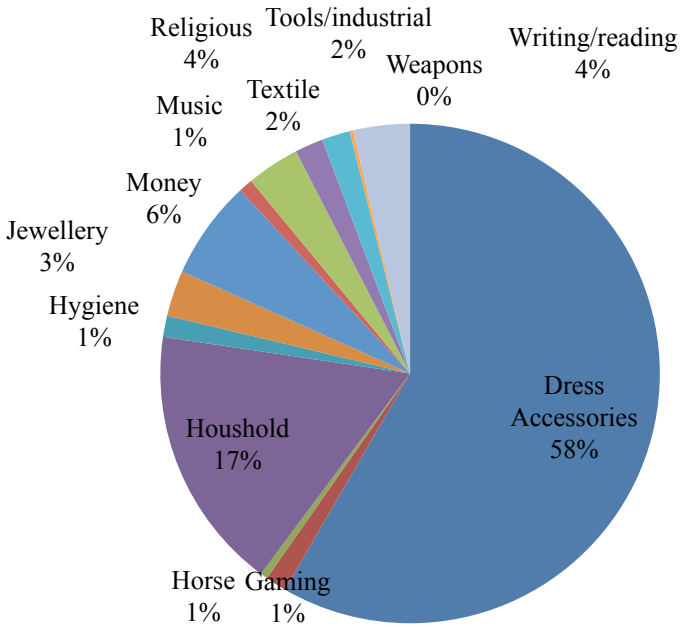


Figure C.11: Artefact Assemblage for Hull Austin Friary

As with many of the other sites in this study, several of the beads found at Hull Austin Friary could be indicative of high status or income, including the jet, glass and amber beads. The jet crucifix could also be an indicator of high status or income, mostly because of the material rather than the object itself. Toothbrushes, similarly, could suggest an attention to personal hygiene not evidenced in sites associated with lower income or working class populations. In fact, toothbrushes are far more commonly associated with post-medieval sites (Hyson, 2003).

Musical instruments, on the other hand, could be indicative of high status or income, not because of their material, but the fact that musical instruments were not something that everybody could afford and they were strongly associated with religious ceremonies (Peters, 2000, p. 203; Pestell, 1987). Wandering minstrels, however, were associated with the lower social strata (Peters, 2000, p. 210-11; Rastall, 1970, p. 84). In short, the presence of four tuning pegs at the Hull Austin Friary alone does not indicate high status, as they could have been used during religious worship or by a minstrel passing through.

C.4.3 Documents

(i) Financial

Very few records survive for Hull Austin Friary, although it is known that by the end of the 15th century the friars were apparently surviving solely on alms (VCH and Page and Page, 1974). Do you have any closer refs i.e. to page numbers for the following? The only property held by the friary was the original foundation property, which was only worth 5s. The house was surrendered on the 10 March 1538 and the pensions provided, if any, are unknown (VCH and Page and Page, 1974).

(ii) Lifestyle

The only record of any disciplinary problems at the friary was a report that a friar named John de Hornyngton had complained to the Crown in 1381 that he was being targeted by the other friars at Hull and that they were trying to expel him (VCH and Page and Page, 1974). He received a writ of protection that allowed him and his household to remain at the friary (*ibid.)*. There no recorded apostate friars from Hull.

C.5 The Priory of St James, Bristol, Gloucestershire

Male; South; Urban; Older Order

The Priory of St James, Bristol was founded around 1137 as a cell of the monastery of Tewkesbury by the earl of Gloucester; it was confirmed in 1181 (VCH and Page and Page, 1907b). The priory had an uneventful history for the most part, with a handful of disagreements with their mother abbey and other local monastic houses. Monks from Tewkesbury Abbey would have been sent to The Priory of St James, Bristol at the abbot's will and the prior of The Priory of St James would have been summoned to the abbey to participate in the election of a new abbot (*ibid.)*.

The priory, although not poor, appears to have struggled to keep its buildings in good repair. In the 14th century, a new tower for the church was needed, but the priory was unable to afford to build it. Because of the close relationship the priory had with the local community, it was agreed that the monks would provide the stone itself (having an agreement with a local quarry), but the townspeople would pay for the construction (Jackson, 2006, p. 18). It would appear that there were other works carried out on the claustral buildings based on the style of the surviving pillars, but there is no documentary record of this work (Jackson, 2006, p. 24).

The priory itself was built to an uncommon layout due to issues with the local landscape. Instead of the priory buildings, i.e. dormitory, cloister, etc., sitting to the south of the church, they were located on the north side instead (Jackson, 2006, p. 24). See Figure C.12 for site plan. Another quirk of the location of the priory as that, although there was a deep well located within the estate, at some time in the 14th century this was either replaced or supplemented by a pipe that brought fresh water direct from a spring some distance away (Jackson, 2006, p. 24).

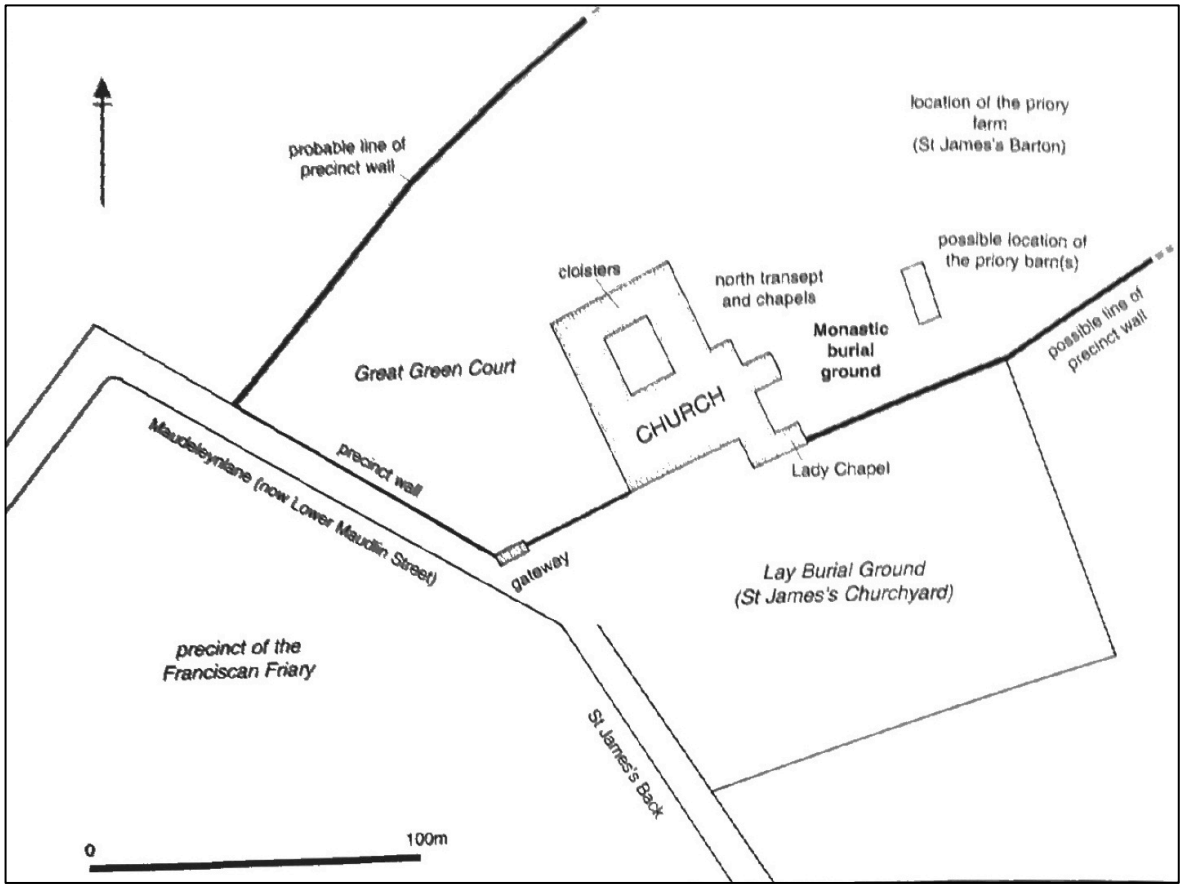


Figure C.12: Site plan for St James' Priory, Bristol (Jackson, 2006, 18)

The archaeological data for this site were collected using the published report by Reg Jackson and the original skeletal recording sheets of Louise Loe (Jackson, 2006; Loe, 1988).

C.5.1 Burials

(i) Demography

There were 252 individuals excavated from the cemetery, all dated to the period associated with the habitation of the priory 1129-1540, and 243 were used in this study. Of those 243, 34 had finds within the grave cutting that dated the individual graves more specifically, although 10 of the finds were associated with the Romano-British period and so point out the difficulty in relying on finds to give an accurate date of a grave, as the graves themselves were associated with a much later period, i.e. the late medieval period.. The nine individuals not included had no associated skeletal inventory. Of the 243 individuals, 101 individuals were identified as male, one as possible male, and 30 females (Figure C.13). There were 85 individuals for whom no sex could be determined. There were also 26 juveniles. This results in a sex ratio of 3.4:1 males to females.

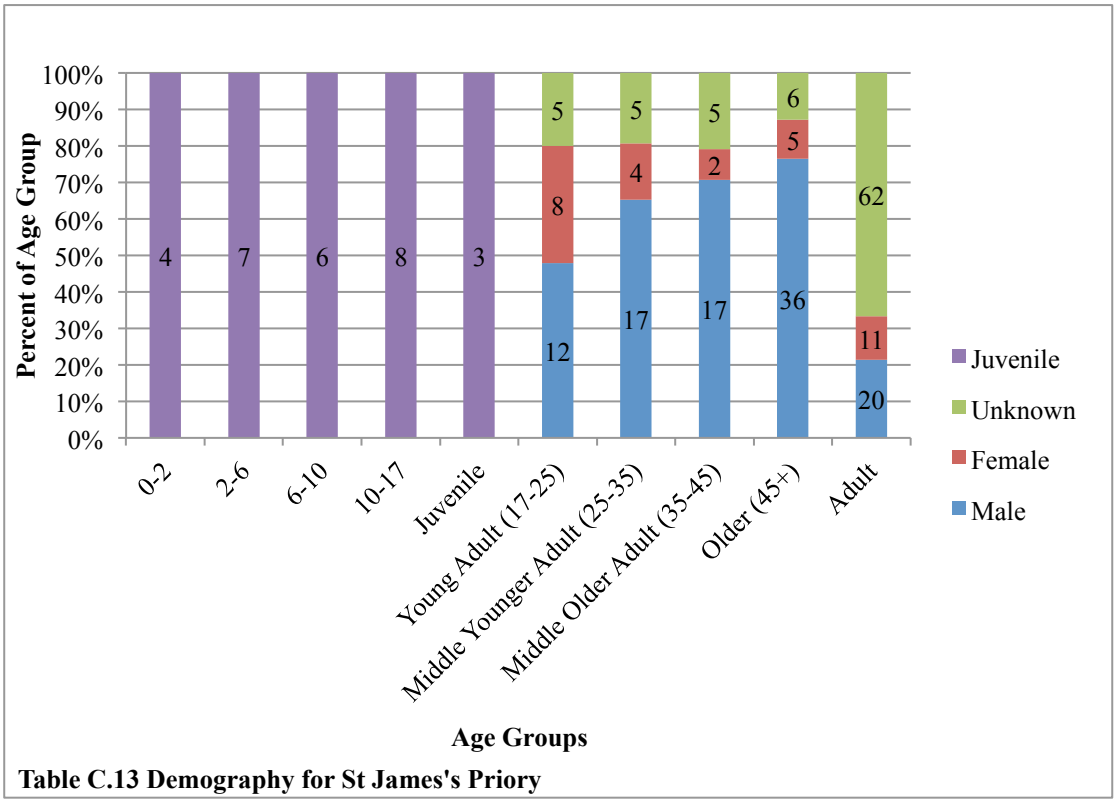


Table C.13 Demography for St James's Priory

The largest age category, overwhelmingly, is that of Adult, with 93 individuals. The Older category is the next largest (47), while the other three adult categories all have between 24-26 individual in each. The largest juvenile category is the 10-17 year olds (8 individuals), although the 2-6 year age group has seven, and the 6-10 group has six. The 0-2 year age category has four individuals and the Juvenile category has three.

As with Hull Austin Friary, the males outnumber the females in every age category. They also comprise a higher proportion in every age category, except the 17-25 group where there are 26.7% females and only 11.7% males, and the Adult group (36.7% females and only 19.6% males. In the other categories males comprise a higher proportion of the total than females: the 25-35 group (16.7% males, 13.3% females), the 35-45 group (16.7% males, 6.7% females), and the 45+ group (35.3% males, 16.6% females).

(ii) Health Indicators

The health indicator that was recorded on the highest percentage of individuals was Dental Caries (23.6% or 30 individuals) (Tables C.36 and C.37). Following closely are Non-Specific Infection (17.4% or 34 individuals), Osteoarthritis (14.0% or 30 individuals), and Calculus (13.4% or 17 individuals). DISH affected 5.8% (6) of all individuals, while 0.9% (2) were affected by Trauma.

Table C.36 Corrected Prevalence Rates for The Priory of St James

Health Indicator	Absent	Present	Percent Affected
Calculus	110	17	13.4%
Caries	97	30	23.6%
DISH	97	6	5.8%
Maxillary Sinusitis	120	0	0.0%
Non-specific Infection	162	34	17.4%
Osteoarthritis	185	30	14.0%
Rib Periostitis	121	0	0.0%
Trauma	225	2	0.9%

Calculus rates displayed the highest elements-wise prevalence rate (428 or 18.0% of teeth). Evidence of Non-Specific Infection was recorded on 7.0% (59) of surviving leg bones. Dental Caries were only recorded on 1.9% (46) of teeth, DISH on 2.4% (32) of vertebrae and Osteoarthritis on 1.8% (36) of joint surfaces.

Table C.37 Elements-wise Prevalence Rates for The Priory of St James.

Health Indicator	Absent	Present	Percent Affected
Calculus	1954	428	18.0%
Caries	2336	46	1.9%
DISH	1321	32	2.4%
Non-specific Infection	782	59	7.0%
Osteoarthritis	1993	36	1.8%
Trauma	1606	2	0.1%

Both a higher number and a higher percentage of males were recorded as having been affected by non-specific infection (28 or 30.8% of males, 3 or 11.1% of females) (Table C.38).

Table C.38 Age and Sex Distribution for Non-Specific Infection: Corrected and Elements-wise Prevalence for The Priory of St James.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	--	--	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	1.0% (2)	0.0% (0)	0.5% (1)	3	0.0% (0)	0.5% (4)	0.0% (0)	0.0% (0)	4
25-35	--	2.6% (5)	0.0% (0)	0.0% (0)	5	--	1.0% (8)	0.0% (0)	0.0% (0)	8
35-45	--	1.5% (3)	0.0% (0)	0.0% (0)	3	--	0.6% (5)	0.0% (0)	0.0% (0)	5
45+	--	7.1% (14)	0.0% (0)	0.5% (1)	15	--	2.5% (21)	0.0% (0)	0.1% (1)	22
Adult	--	2.0% (4)	1.5% (3)	2.6% (5)	12	--	0.5% (4)	0.6% (5)	1.3% (11)	20
Total	0	28	3	7	38	0	42	5	12	59

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

A similar pattern is seen with OA, with 22.6% of males (23) being affected and only 13.3% (4) of females and 4.7% (4) of unknown adults (Table C.39). All four females with OA recorded were affected solely in their vertebrae, while the unknowns were affected in their vertebrae and the joints of one wrist. The area of the skeleton most commonly affected in males at St James was also the vertebrae (17 individuals affected; four in their wrists). The knee, rib and ankle joints each had 2 reported occurrences, while the mandible and hip had only one.

Table C.39 Age and Sex Distribution for Osteoarthrits: Corrected and Elements-wise Prevalence for The Priory of St James.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
17-25	--	0.0% (0)	0.0% (0)	0.5% (1)	1	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	--	1.4% (3)	0.5% (1)	0.0% (0)	4	--	0.1% (3)	0.05% (1)	0.0% (0)	4
35-45	--	2.8% (6)	0.0% (0)	0.0% (0)	6	--	0.2% (5)	0.0% (0)	0.0% (0)	5
45+	--	6.5% (14)	0.5% (1)	1.4% (3)	18	--	1.0% (20)	0.05% (1)	0.1% (3)	24
Adult	--	0.0% (0)	0.9% (2)	0.5% (1)	3	--	0.0% (0)	0.1% (2)	0.05% (1)	3
Total	--	23	4	5	32	0	28	4	4	36

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The prevalence rates are similar for the Caries category, with 27.1% (19) of males and 26.1% (6) of unknowns being affected by caries and only 10.5% (2) of females (Table C.40). The story is different when the elements-wise prevalence rates are examined, with 1.8% (27) of male teeth affected and 2.9% (9) of female teeth. Only 2.2% (7) of the teeth of adults of undetermined sex have recorded carious lesions.

Table C.40 Age and Sex Distribution for Dental Caries Corrected and Elements-wise Prevalence for The Priory of St James.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	1.6% (2)	--	--	--	2	0.1% (2)	--	--	--	2
10-17	0.8% (1)	--	--	--	1	0.04% (1)	--	--	--	1
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
17-25	--	1.6% (2)	0.8% (1)	0.8% (1)	4	--	0.1% (2)	0.3% (8)	0.04% (1)	11
25-35	--	3.1% (4)	0.0% (0)	0.8% (1)	5	--	0.3% (8)	0.0% (0)	0.04% (1)	9
35-45	--	1.6% (2)	0.8% (1)	0.0% (0)	3	--	0.1% (2)	0.04% (1)	0.0% (0)	3
45+	--	8.7% (11)	0.0% (0)	3.1% (4)	15	--	0.6% (15)	0.0% (0)	0.2% (5)	20
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Total	3	19	2	6	30	3	27	9	7	46

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

A higher percentage of males (15) than females (1) were affected by calculus (21.1% versus 5.3%), and this is supported by elements-wise prevalence rates (377 or 25.3% of male teeth, and only 32 or 10.3% of female teeth) (Table C.41).

Table C.41 Age and Sex Distribution for Dental Calculus: Corrected and Elements-wise Prevalence for The Priory of St James.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
17-25	--	0.8% (1)	0.8% (1)	0.0% (0)	2	--	1.2% (29)	1.3% (32)	0.0% (0)	61
25-35	--	0.8% (1)	0.0% (0)	0.0% (0)	1	--	1.3% (30)	0.0% (0)	0.0% (0)	30
35-45	--	4.7% (6)	0.0% (0)	0.0% (0)	6	--	6.9% (164)	0.0% (0)	0.0% (0)	164
45+	--	5.5% (7)	0.0% (0)	0.8% (1)	8	--	6.5% (154)	0.0% (0)	0.8% (19)	173
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Total	0	15	1	1	17	0	377	32	19	428

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

No males or females were recorded as having any indication of trauma, but 2.8% (2) of adults of undetermined sex had evidence of traumatic events (Table C.42). One of the unknown individuals had a femur with a badly healed fracture, a fractured fibula, and one fractured phalanx (although not being a long bone, this was not included in the statistical analysis), while there was no specific information for the other individual.

Table C.42 Age and Sex Distribution for Trauma: Corrected and Elements-wise Prevalence for St James' Priory.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
35-45	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
45+	--	0.0% (0)	0.0% (0)	0.9% (2)	2	--	0.0% (0)	0.0% (0)	0.1% (2)	2
Total	0	0	0	2	2	0	0	0	2	2

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The final health indicator recorded at the Priory of St James is DISH, where the only individuals affected were six males (5.9%) (Table C.43). A total of 32 vertebrae were affected or 2.3% of all the male vertebrae. Unsurprisingly, the majority of the individuals affected were in the 45+ age group.

Table C.43 Age and Sex Distribution for DISH: Corrected and Elements-wise Prevalence for The Priory of St James.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
25-35	--	1.0% (1)	0.0% (0)	0.0% (0)	1	--	0.3% (4)	0.0% (0)	0.0% (0)	4
35-45	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
45+	--	4.9% (5)	0.0% (0)	0.0% (0)	5	--	2.0% (28)	0.0% (0)	0.0% (0)	28
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Total	--	6	0	0	6	--	32	0	0	32

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

C.5.2 Artefacts

Unfortunately, the artefact assemblage of The Priory of St James consists of only six artefacts. When the southern monastic sites for this study were being identified, finding a site with burials was the top priority, as large skeletal assemblages from many cemetery sites are not common. The Priory of St James was one of only a handful of southern monastic sites that had a large skeletal population and was the only site that fitted the other criteria required, i.e. urban and of an Older Order. Because of this, a larger artefact assemblage size was sacrificed in order to ensure that a southern, urban male monastic house of an older order was included in the study.

The six artefacts are two lace chaps, a plain copper ring, a jet pendant and two silver pennies. The jet pendant is the only artefact of the six that could be construed as being high status or income. However, the pendant has been modified from the original design, of a ring and dot motif, and is roughly pentagonal in shape with a cross etched into it (Jackson, 2006, p. 142). It is only the jet material that could suggest high status or income, but in its re-used state, this seems unlikely. It was found associated with a 35-45 year old male (Jackson, 2006, p. 142).

C.5.3 Documents

(i) Financial

The original foundation of the priory was quite generous and included at least seven churches, three chapels, the profits of a fair in Bristol, the rents of four mills and a manor (VCH and Page and Page, 1907b). At the same fair, in 1238 the priory was able to grant an indulgence of 15 days to all those who gave alms to a new church the priory was building. Through these donations, the priory was able to finish building the church, which was dedicated the following year (VCH and Page and Page, 1907b).

The value of the priory was £57 7s 4d in 1535, which included £31 in rents from the properties held in Bristol (VCH and Page and Page, 1907b). The priory held a total of 21 properties in the two counties of Cornwall and Gloucester (Jurkowski and Ramsay, 2007a, p. 132). It is believed that it was surrendered as part of Tewkesbury Abbey on 9 January 1539. The prior received a pension of £13 6s 8d, and the other three or four monks' pensions were included in the papers of Tewkesbury Abbey (VCH and Page and Page, 1907a). The average pension for a monk at Tewkesbury Abbey, however, was £6 13s 4d (VCH and Page and Page, 1907a).

(ii) Lifestyle

The priory was involved in a dispute with the local Dominican priory in 1230 over the building of an oratory. The monks protested, but the friars went ahead with the construction and the records of Tewkesbury claim that the friars took offerings from people who would have donated to The Priory of St James, robbing the priory of part of their rightful income (VCH and Page and Page, 1907b).

Aside from this incident, there are no records suggesting that The Priory of St James had any significant problems with the larger community or within their own.

C.6 St Mary's Abbey (Nunnaminster), Winchester, Hampshire

Female; South; Urban; Older Order

King Alfred and Queen Eahlswith founded Nunnaminster towards the end of the ninth century and the building works were completed under the direction of their son, Edward. His daughter, Edburga, went on to become the nunnery's first abbess (VCH and Page and Page, 1973). It would appear that the original endowment was insufficient, as the abbey fell into poverty and had to be re-endowed and rebuilt in 963 (WMS, 1993; VCH and Page and Page, 1973).

Royalty played a large part throughout the life of the abbey, for good or ill. In 1141, during the civil war between Maud and Stephen, the entire city of Winchester, including the abbey, was burnt down and had to be rebuilt (VCH and Page and Page, 1973). The buildings that were burnt to the ground had only been erected in stone in the new Norman style in the early part of the same century (WMS, 1993). In the 13th century there was some fairly major repairs, including the reflooring of the church and cloisters, followed by further repair work and extensions taking place in the following century (WMS, 1993). See Figure C.14 for a site plan.

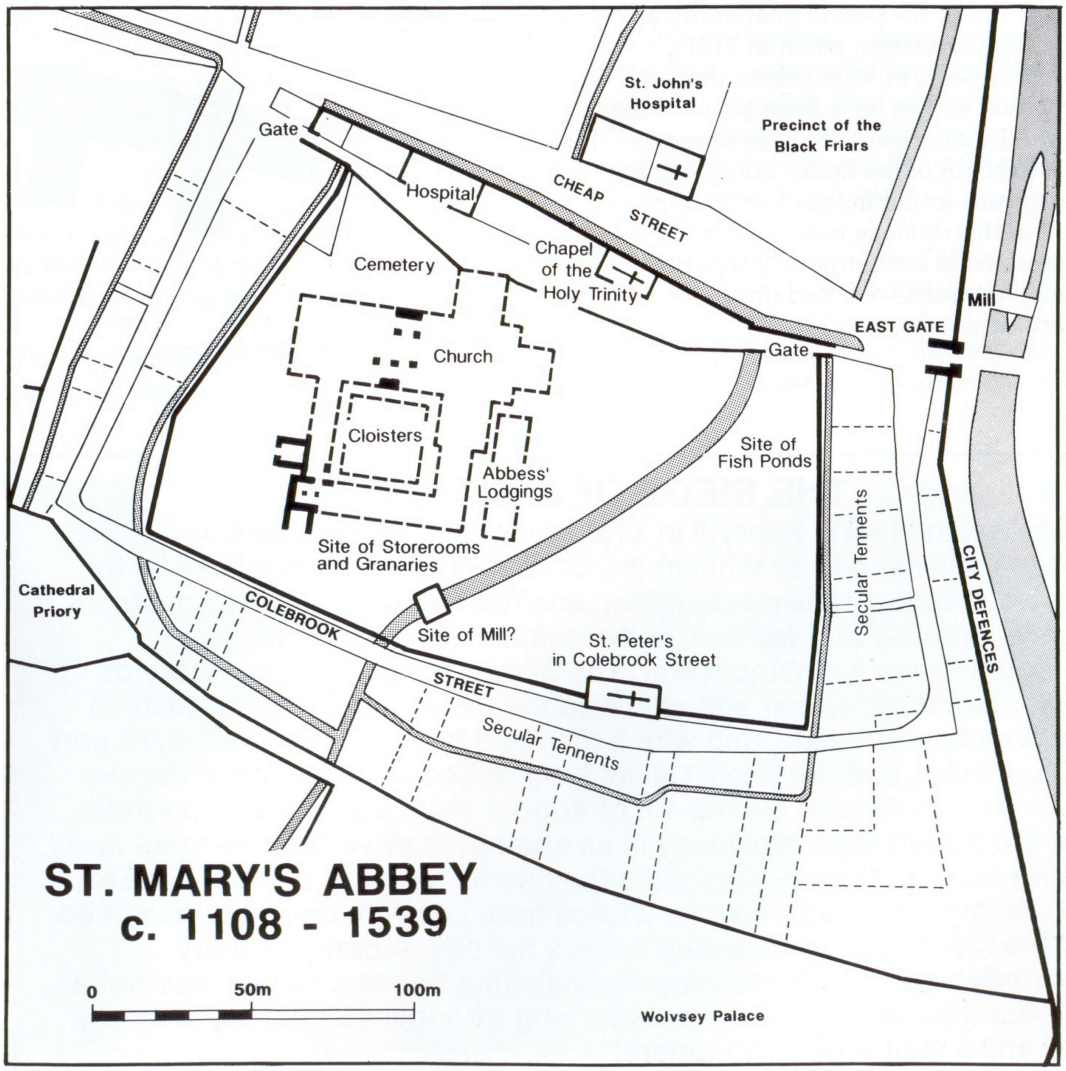


Figure C.14: Site plan for Nunnaminster (WMS, 1993)

In 1310, the king requested a loan from a number of religious houses for his Scottish campaign, including nine nunneries of which both Elstow and Nunnaminster were included. This loan sent Nunnaminster into poverty, which they resolved by appealing to the pope for aid in the form of granting them one of the local parish churches, Froyle (Power, 1922, p. 186; VCH and Page and Page, 1973). Unfortunately for the nuns, the pope ordered that it should be granted through their local diocese, but it was refused by the bishop. The pope eventually intervened and the nuns were granted the church (VCH and Page and Page, 1973).

The abbey suffered from several periods of debt, but was found to be free of debt at the Dissolution. When Nunnaminster was valued originally in 1535 it was found to have a gross annual value of £245 17s 2½d (VCH and Page and Page, 1973). Because of the gross valuation and a substantial bribe of £333 6s 8d, Nunnaminster escaped the first suppression. The abbey was signed over two years after this first suppression in 1539 on 15 November.

The archaeological data for this site were collected using the original finds recording book and the

original skeletal recording sheets by Sue Browne (Browne, 1986a; Browne, 1986b; Nunnaminster Small Finds).

C.6.1 Burials

(i) Demography

Of the 74 individuals found buried in the grounds of Nunnaminster, 39 individuals were included in this study, all dated to the later medieval period. The 35 not included were omitted because they were not included in the final analysis carried out by Sue Browne. The demographic information for the 39 individuals can be found in Figure C.14.

The male to female ratio is 7:8 (when ?M and ?F are included in the M and F groups, respectively), with females comprising only a slightly higher percentage (41%) than the males (35.9%). The eight Juveniles make up only 20% of the total and the single unsexed individual only 2.6%.

The largest age category, by far is that of the Adult group (38.5%), followed by both the Young and the Middle Younger Adult age groups, each comprising 15.4%. The 0-2 year group makes up 12.8% and the Older group only 7.7%. The remaining three groups, 6-10 (5%), 10-17, and the Middle Older group (2.6% each), are made up by the final four individuals.

However, the age groups are not comprised of equal numbers for each sex. As can be seen in Table C.15, the sexes fall into very different age groups. The Adult group has almost equal numbers, but females make up the majority in the Young Adult and the Older group, while males are the majority in the Middle Younger group, and the only individual in the Middle Older group is also male.

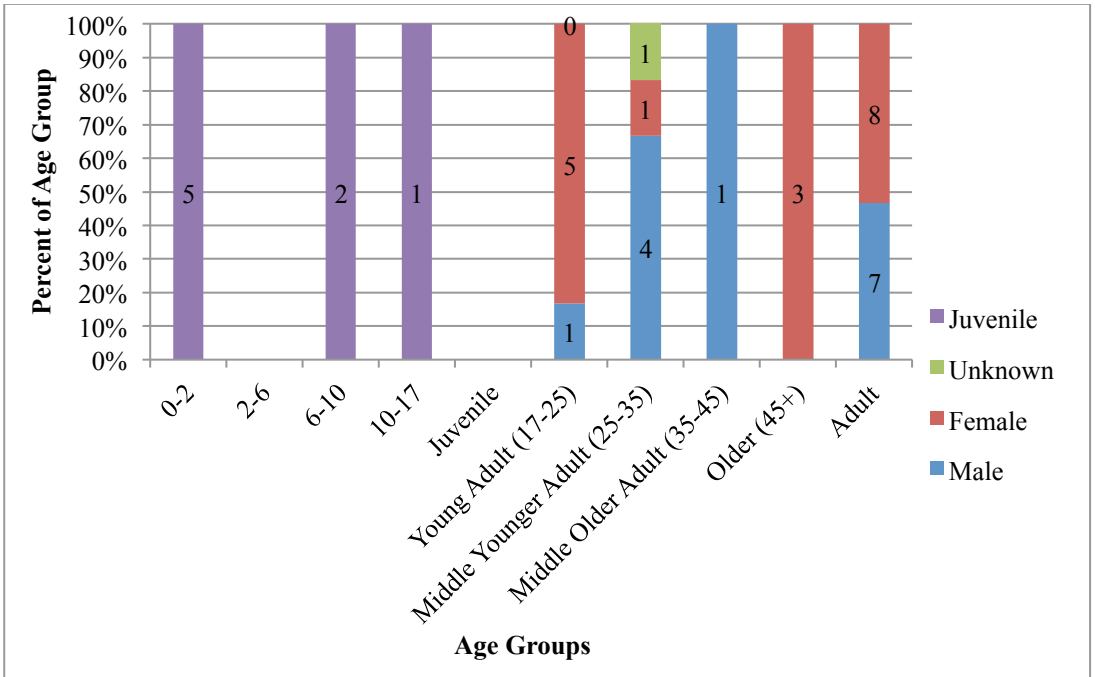


Figure C.15: Demography for Nunnaminster

This equal nature of the sexes has lead some to believe that these burials do not, in fact, represent a nunnery cemetery, but rather a civilian cemetery (G. Scobie, pers comm 15 Jan 2010). However, as identifying a monastic group within the burial grounds of a religious house is virtually impossible, it is not out of the question that this is a mix of both civilian and monastic individuals, especially considering that the staff of office was found with one of the females (Gilchrist and Sloane, 2005, p. 68).

(ii) Health Indicators

The health indicator which affected the highest proportion of the cemetery population at Nunnaminster was Calculus, affecting 67.9% (19) of individuals (Tables C.44 and C.45). Following Calculus, Osteoarthritis affected 64.5% (20) ,but only 43 or 10.2% of joint surfaces, dental caries affected 21.4% (6) of individuals and trauma affected 7.8% (3). DISH, Rib Periostitis and Sinusitis were not recorded as having affected any of the individuals in the cemetery.

Table C.44 Corrected Prevalence Rates for Nunnaminster

Health Indicator	Absent	Present	Percent Affected
Calculus	9	19	67.9%
Caries	22	6	21.4%
DISH	16	0	0.0%
Maxillary Sinusitis	28	0	0.0%
Non-specific Infection	36	0	0.0%
Osteoarthritis	11	20	64.5%
Rib Periostitis	0	0	0.0%
Trauma	35	3	7.8%

Table C.45 Elements-wise Prevalence Rates for Nunnaminster

Health Indicator	Absent	Present	Percent Affected
Calculus	135	335	71.3%
Caries	462	8	1.7%
DISH	264	0	0.0%
Non-specific Infection	190	0	0.0%
Osteoarthritis	379	43	10.2%
Trauma	379	4	1.0%

When prevalence rates for Calculus are divided into age and sex groups it is clear that the males at Nunnaminster are more affected (11 or 78.6% of females, and 6 or 85.7% of males) (Table C.46). When elements-wise prevalence rates are explored, the situation is reversed (197 or 90.4% of female teeth and 106 or 84.1% for male).

Table C.46 Age and Sex Distribution for Dental Calculus Corrected and Elements-wise Prevalence for Nunnaminster.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	3.6% (1)	--	--	--	1	1.0% (5)	--	--	--	5
10-17	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
Juvenile	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
17-25	--	3.6% (1)	17.9% (5)	0.0% (0)	6	--	4.3% (20)	23.0% (108)	0.0% (0)	128
25-35	--	10.7% (3)	3.6% (1)	3.6% (1)	5	--	8.5% (40)	6.0% (28)	5.7% (27)	95
35-45	--	3.6% (1)	0.0% (0)	0.0% (0)	1	--	5.3% (25)	0.0% (0)	0.0% (0)	25
45+	--	0.0% (0)	3.6% (1)	0.0% (0)	1	--	0.0% (0)	2.8% (13)	0.0% (0)	13
Adult	--	3.6% (1)	14.3% (4)	0.0% (0)	5	--	4.5% (21)	10.2% (48)	0.0% (0)	69
Total	1	6	11	1	19	5	106	197	27	335

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Equal numbers (12) of males and females at Nunnaminster were affected by osteoarthritis (85.7% of males, and 75.0% of females) (Table C.47). The vertebrae were the most commonly affected, with 19 individuals having indications. Following vertebral osteoarthritis, the next most commonly affected joint was the knee (10 individuals), and then hips and shoulders (7 individuals each). Five individuals had OA on ribs, four on the elbow joint, three on the hand or wrist joints, and one on the ankle joint.

The only joint that appears to be disproportionally affected by sex is the knee, where eight females are affected and only two males. Vertebral OA affected nine females and ten males, the shoulder in three females and four males, the hip in four females and three males, and the ribs in two females and three males.

Table C.47 Age and Sex Distribution for Osteoarthritis: Corrected and Elements-wise Prevalence for Nunnaminster.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
		6.5%	9.7%	0.0%		0.0%	0.5%	0.7%	0.0%	
17-25	--	(2)	(3)	(0)	5	(0)	(2)	(3)	(0)	5
		12.9%	3.2%	0.0%			3.1%	0.0%	0.0%	
25-35	--	(4)	(1)	(0)	5	--	(13)	(0)	(0)	13
		3.2%	0.0%	0.0%			0.2%	0.0%	0.0%	
35-45	--	(1)	(0)	(0)	1	--	(1)	(0)	(0)	1
		0.0%	6.5%	0.0%			0.0%	2.1%	0.0%	
45+	--	(0)	(2)	(0)	2	--	(0)	(9)	(0)	9
		16.1%	19.4%	0.0%			1.7%	1.9%	0.0%	
Adult	--	(5)	(6)	(0)	11	--	(7)	(8)	(0)	15
Total	--	12	12	0	24	0	23	20	0	43

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

With the exception of one juvenile and one individual of unknown sex, the only individuals affected with carious lesions are female (Table C.48). One female and the individual of unknown sex have two caries, but the other four individuals have only one carious lesion each.

Table C.48 Age and Sex Distribution for Dental Caries: Corrected and Elements-wise Prevalence for Nunnaminster.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
	0.0%					0.0%				
0-2	(0)	--	--	--	0	(0)	--	--	--	0
	0.0%					0.0%				
2-6	(0)	--	--	--	0	(0)	--	--	--	0
	0.0%					0.0%				
6-10	(0)	--	--	--	0	(0)	--	--	--	0
	3.6%	0.0%	0.0%			0.2%	0.0%	0.0%		
10-17	(1)	(0)	(0)	--	1	(1)	(0)	(0)	--	1
	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%		
Juvenile	(0)	(0)	(0)	--	0	(0)	(0)	(0)	--	0
		0.0%	10.7%	0.0%			0.0%	0.9%	0.0%	
17-25	--	(0)	(3)	(0)	3	--	(0)	(4)	(0)	4
		0.0%	3.6%	0.0%			0.0%	0.2%	0.0%	
25-35	--	(0)	(1)	(0)	1	--	(0)	(1)	(0)	1
		0.0%	0.0%	0.0%			0.0%	0.0%	0.0%	
35-45	--	(0)	(0)	(0)	0	--	(0)	(0)	(0)	0
		0.0%	0.0%	0.0%			0.0%	0.0%	0.0%	
45+	--	(0)	(0)	(0)	0	--	(0)	(0)	(0)	0
		0.0%	0.0%	3.6%			0.0%	0.0%	0.4%	
Adult	--	(0)	(0)	(1)	1	--	(0)	(0)	(2)	2
Total	1	0	4	1	6	1	0	5	2	8

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The only individual with recorded non-specific infection was a juvenile in the 6-10 year age group

(left temporal bone).

The six individuals with recorded trauma were all in the Adult age group (three males and three females). The three occurrences of trauma among the males were a healed right tibia and fibula, a single fractured phalanx (whether it was hand or foot was not recorded), and fusion of T6-12, attributed to poor healing following trauma. The traumatic lesions recorded among the females were a fracture of the first rib, a distal right ulna and a left fibula, the latter being noted to have just begun to show signs of healing.

C.6.2 Artefacts

As with most of the other sites in this study, the largest artefact category, 58% (67), is the Dress Accessories class. The artefact that dominates the class, as with the other nunneries, with the exception of Sinningthwaite Priory, is pins. As discussed above, pins would have been used to secure, not only the characteristic wimple, but also other items of clothing (Egan and Pritchard, 1991, p. 297-303).

The Religious class, making up 11% (13) of the total, is dominated by beads. It is likely that these beads were from rosaries. Many of these beads suggest high status or a good income as they are made of rare materials, including pearl, ivory, jet, amethyst and blue glass. Others are made of bone, wood or limestone, which are more readily available materials. The only other item in the Religious class is an ivory or bone staff top that was found in a burial and will be discussed below. The Household artefact class is the next largest, making up 10% (12) of the total artefacts found at Nunnaminster. No single artefact dominates the Household class; it is made up of blades, vessel fragments, keys, and a barrel hoop fragment. Money follows as the next largest artefact class, making up 7% (8), and is comprised solely of coins. Jewellery (6), 5%, follows and is made up of three rings, two brooches and a chain. Both the Hygiene (3) and Textile (4) classes fall at 3%. The Hygiene class has three combs and the Textile class of two needles, a thimble and a spindle whorl. Both the Writing/Reading and Gaming class have only one artefact apiece, a single pencil fragment and a single gaming piece.

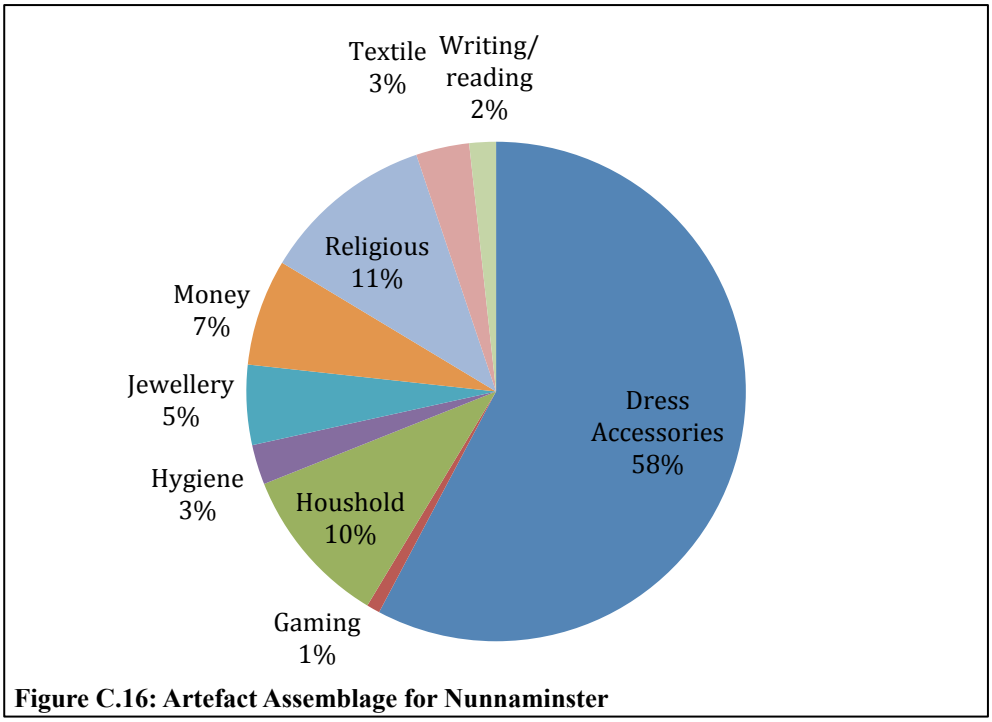


Figure C.16: Artefact Assemblage for Nunnaminster

As mentioned above the ivory, pearl, jet, blue glass and amethyst beads are indicative of high status or income. Another item that could be similarly suggested is a tortoise shell comb tooth (Artefact No. COE 63).

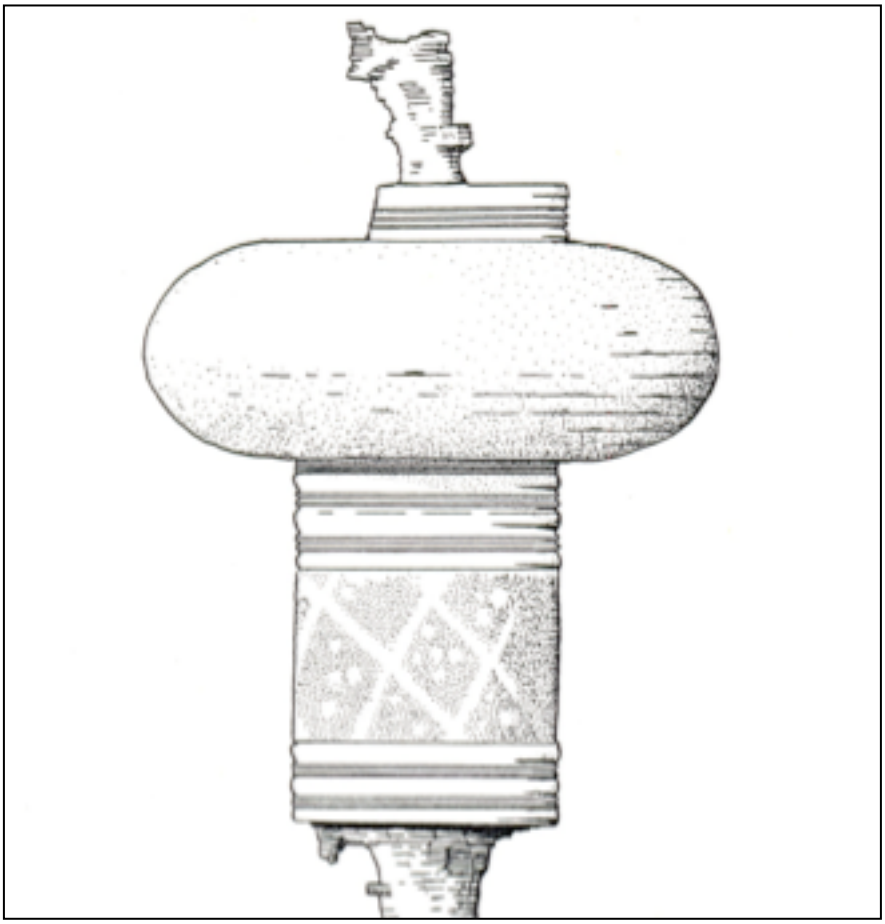


Figure C.17: Staff of Office found at Nunnaminster (WMS, 1993)

The staff mentioned above (Figure C.17) was found with individual 449, a female in the 45+ age group. The tourist booklet suggests that this individual could be an abbess or have held another office, possibly even a secular office, within the nunnery (Winchester Museums Service, 1993). It is made of bone and ivory, with a wooden core and iron shaft. The decorated portion also has some areas of gold infill (Figure C.18).

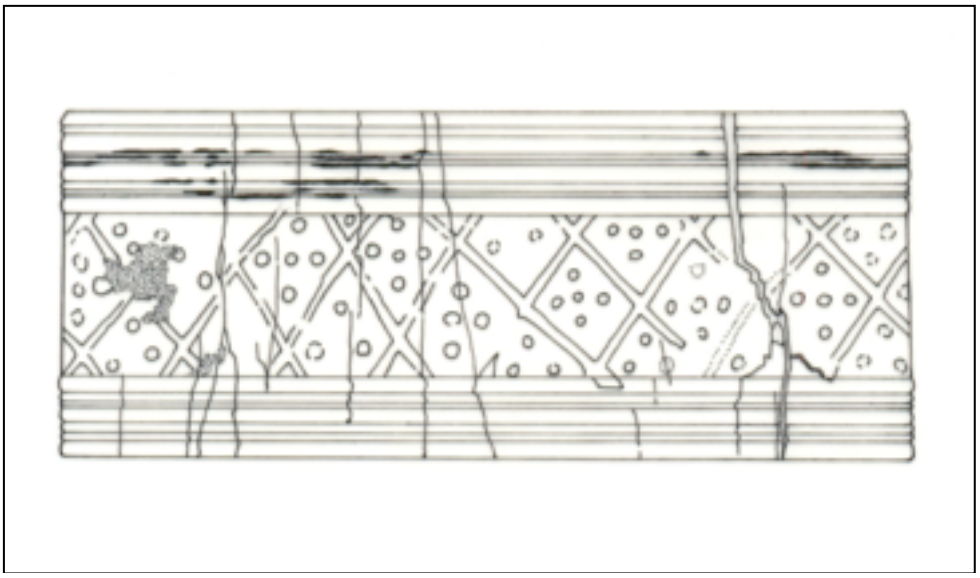


Figure C.18: Decorated portion of Nunnaminster Staff (WMS, 1993)

C.6.3 Documents

(i) Financial

Although the details of the original endowment are lost, it is known that Nunnaminster is recorded in the Doomsday Book. In the time of Edward the Confessor it was valued at £64 15s 0d with its holdings of 84 hides, but in the reign of William the Conqueror it was valued at £92 15s 0d, with 35 carucates. (Record Commission 1894) The reason for this discrepancy is not known.

At Dissolution the abbey was valued at £178 16s 11¼d for its actual annual value and £245 17s 2½d for its gross annual value, as with the Doomsday records, but the reason for the difference is unknown (Record Commission 1894, VCH and Page and Page, 1973). The holdings of the nunnery included nine churches, 15 manors and at least one urban property (Jurkowski and Ramsay, 2007a, p. 176). The abbess, Elizabeth Shelley, was paid a pension of £26 13s 4d and the prioress a pension of £5. A total of 23 individuals were granted pensions when the nunnery was dissolved, sharing a total of £46 (Record Commission 1894, VCH and Page and Page, 1973).

(ii) Lifestyle

During the fourteenth century in the bishopric of William of Wykeham, Nunnaminster came to his attention a few times for disciplinary problems. On one such occasion, in 1384, he wrote to the

abbess of Nunnaminster regarding the problems she was having with the insubordination of the nuns (Power, 1922, p. 300). In 1370, William of Wykeham wrote regarding a specific nun who had been "deserted" (Power, 1922, p. 300), in his words, and was recorded as having been "party to her own abduction" (Logan, 1996, p. 259). She returned pregnant six months later. William of Wykeham urged the nunnery to take her back, which they did (Logan, 1996, p. 259; Power, 1922, p. 300).

In 1517, Bishop Richard Fox translated the Benedictine Rule into English for all the nuns in the (his?) Winchester diocese, with the view that the nuns needed to be able to understand the Rule in order to follow it (Power, 1922, p. 252). The education of the nuns at Nunnaminster could not have been too bad, however, as they ran a school that, in 1536, had as many children under its tutelage as it had nuns (Power, 1922, p. 265).

Power uses St Mary's as an example of a house with a large number of domestic and other servants (1922, p. 151). When the nunnery was visited ahead of the Dissolution, it was found that, alongside the Abbess, the 26 nuns, 13 lay sisters, 26 students, three corrodians and five chaplains there were 31 officers and servants. The Abbess had an additional three private servants and the prioress, subprioress, sacrist and another office holder each had their own private servant (*ibid.)*. Power compares this with St Radegund's, Cambridge, with its 12 nuns supporting seven domestic servants, remarking that even a modest house, such as St Radegund's, had quite a large number of servants (1922, p. 152-3).

C.7 Sinningthwaite Priory, Bilton in Ainsty, North Yorkshire

Female; North; Rural; Reform Order

The Priory of Sinningthwaite was founded in approximately 1160 by Bertram Haget and endowed with gifts by her son Geoffery Haget; both were confirmed by Roger de Mowbray (VCH and Page and Page, 1974). In 1314-5 an injunction was issued to the house that any nuns who were ill should be taken care of within the means of the house (VCH and Page and Page, 1974). They were also urged in both 1314-5 and 1319 to keep outsiders, including friars and priests, as well as one William de Tymberland, out of the private areas of the house (*ibid.)*. Sinningthwaite Priory was also given a number of injunctions and restrictions based on its poverty, including the insistence on caring for sick nuns mentioned above, as well as requirements that the house rather than relatives provide clothing to individuals nuns (VCH and Page and Page, 1974).

Never a wealthy house, Sinningthwaite Priory held only eight different properties, all being within the (old) West Riding of Yorkshire. They were comprised of one church, which was later turned over to the archbishop where it was transformed into a prebend under the patronage of the convent, and seven manors (Jurkowski and Ramsay, 2007b, p. 611; VCH and Page and Page, 1974). A full

ground plan of the priory was not available at the time of data collection.

The site was excavated in 2006 as part of a consultation undertaken ahead of the construction of a set of holiday cottages (pers comm Steve Timms 23 April 2012; Timms, 2006, p. 1). The excavation focused primarily on the eastern range of the property and uncovered a portion of the church wall, over one hundred individuals and a handful of artefacts. As much of the northern ranges were not excavated, a full site plan was never produced (Timms, 2006). Among the artefacts was a cauldron buried under the floor of what had most likely been the dormitory; it will be discussed in more depth below (pers comm Steve Timms 23 April 2012; Barker, 2008). It is believed that the cemetery extended far beyond the northern side of the church, but, due to budgetary constraints, only the areas already identified could be excavated (pers comm Steve Timms 23 April 2012).

The archaeological data for this site were collected from the original small finds catalogue and the original skeletal recording sheets by Malin Holst (Holst, 2009; Sinningthwaite Small Finds).

C.7.1 Burials

(i) Demography

One hundred and thirty individuals were recovered from the Sinningthwaite Priory site and included in this study as all dated to the medieval period in question. There were a few other individuals not included as the approximate time of their interment could not be determined, and it was possible that they were post-medieval in date. Of those 130 individuals, 36 were identified as male, three as possible males, 55 as female and 4 as possible females, giving a ratio of approximately 1.5:1. There were also eight adults of undetermined sex and 25 juveniles (Figure C.19).

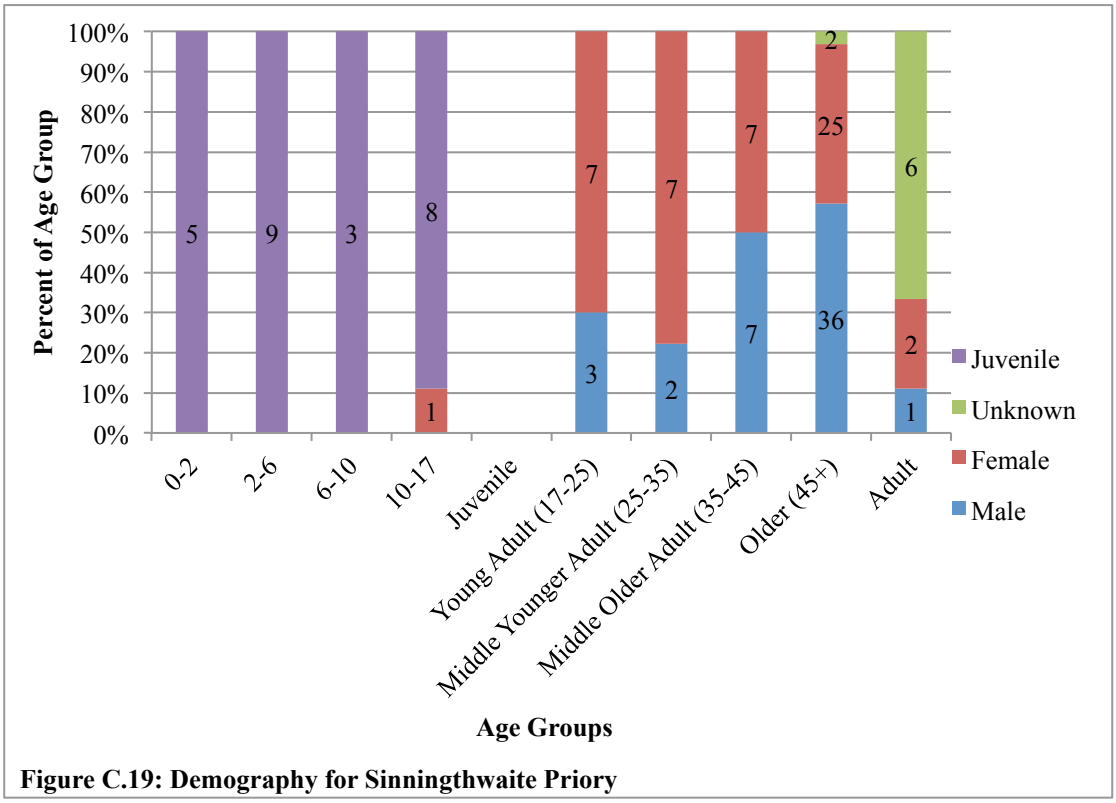


Figure C.19: Demography for Sinningthwaite Priory

The largest age group, by far, was the Older (45+) adult category, followed by the 35-45, the 17-25 and finally the 25-35 age groups. There were ten individuals in the 17-25 age category, nine individuals in the 25-35 age category, and nine in the 2-6 and 10-17 age groups.

Although the females outnumber the males overall, this occurs only in two age categories (the 17-25 and 25-35 age groups). In the 35-45 age category, the numbers are equal and in the 45+ group the males outnumber the females. This is mildly surprising given that the cemetery was associated with a nunnery and suggests that many of the individuals buried here would have been linked to the nunnery in other ways, perhaps as servants, farm workers or members of local villages.

(ii) Health Indicators

The health indicatory that affected the highest proportion of individuals within the cemetery population of Sinningthwaite Priory was dental calculus, affecting 90.9% (90) of the individuals and 63.3% (1098) of teeth (Tables C.49 and C.50). Non-specific infection affected almost 60% (74) of the individuals and a quarter of the leg bones recovered. Dental caries were identified in 50.5% (50) of individuals, but only 8.7% (150) of teeth. Maxillary sinusitis was identified in 20% (17) of individuals, with trauma (12), osteoarthritis (5), DISH (1) and rib periostitis (1) affecting less than 10% of all individuals. The elements-wise prevalence rates of these indicators are even lower.

Table C.49: Corrected Prevalence Rates for Sinningthwaite Priory

Health Indicator	Absent	Present	Percent Affected
Calculus	9	90	90.9%
Caries	49	50	50.5%
DISH	102	1	1.0%
Maxillary Sinusitis	68	17	20.0%
Non-specific Infection	52	74	58.8%
Osteoarthritis	62	5	7.5%
Rib Periostitis	100	1	1.0%
Trauma	118	12	9.2%

Table C.50: Elements-wise Prevalence Rates for Sinningthwaite Priory

Health Indicator	Absent	Present	Percent Affected
Calculus	637	1098	63.3%
Caries	1585	150	8.7%
DISH	1599	19	1.2%
Non-specific Infection	508	170	25.1%
Osteoarthritis	1426	267	15.8%
Trauma	1283	15	1.2%

The breakdown of the corrected and elements-wise prevalence rates for dental calculus is shown in Table C.51. When corrected prevalence rates are explored, 96.7% (29) of males were affected and 100% of females (49) and adults of undetermined sex (3), with only 52.9% (9) of juveniles. The elements-wise prevalence rates were lower, but similarly balanced between the sexes. Of those teeth that were affected by dental calculus, 76.6% (375) were male and 75.4% (658) were female, while only 43.9% (18) of the adults of undetermined sex had teeth with calculus and 1C.59% (47) of juveniles.

Table C.51 Age and Sex Distribution for Dental Calculus: Corrected and Elements-wise Prevalence for Sinningthwaite Priory.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	1.0% (1)	--	--	--	1	0.2% (4)	--	--	--	4
2-6	3.0% (3)	--	--	--	3	0.3% (6)	--	--	--	6
6-10	1.0% (1)	--	--	--	1	0.05% (1)	--	--	--	1
10-17	4.0% (4)	0.0% (0)	1.0% (1)	--	5	2.1% (36)	0.0% (0)	0.5% (8)	--	44
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	3.0% (3)	7.1% (7)	0.0% (0)	10	--	1.4% (24)	7.3% (126)	0.0% (0)	150
25-35	--	1.0% (1)	6.1% (6)	0.0% (0)	7	--	0.3% (6)	5.9% (103)	0.0% (0)	109
35-45	--	3.0% (3)	6.1% (6)	0.0% (0)	9	--	2.8% (48)	5.6% (97)	0.0% (0)	145
45+	--	22.2% (22)	29.3% (29)	2.0% (2)	53	--	17.1% (297)	18.7% (324)	0.5% (8)	629
Adult	--	0.0% (0)	0.0% (0)	1.0% (1)	1	--	0.0% (0)	0.0% (0)	0.6% (10)	10
Total	9	29	49	3	90	47	375	658	18	1098

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The number of individuals and leg bones affected by non-specific infection are shown in Table C.52. Looking at corrected prevalence rates, 73.7% (28) of males were affected, 61.4% (35) of females, 71.4% (5) of adults of undetermined sex and 25% (6) of juveniles. The elements-wise prevalence rates are lower, with 38.2% (78) of male leg bones affected, 25.6% (80) for females, 30% (9) of adults of undetermined sex, and 2.3% (3) of juveniles.

Table C.52 Age and Sex Distribution for Non-Specific Infection: Corrected and Elements-wise Prevalence for Sinningthwaite Priory.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.8% (1)	--	--	--	1	0.0% (0)	--	--	--	0
2-6	1.6% (2)	--	--	--	2	0.3% (2)	--	--	--	2
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	2.4% (3)	0.0% (0)	0.0% (0)	--	3	0.1% (1)	0.0% (0)	0.0% (0)	--	1
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	0.0% (0)	1.6% (2)	4.8% (6)	0.0% (0)	8	0.0% (0)	0.9% (6)	2.5% (17)	0.0% (0)	23
25-35	--	0.8% (1)	4.8% (6)	0.0% (0)	7	--	0.4% (3)	2.5% (17)	0.0% (0)	20
35-45	--	3.2% (4)	4.0% (5)	0.0% (0)	9	--	1.6% (11)	1.5% (10)	0.0% (0)	21
45+	--	15.1% (19)	13.5% (17)	1.6% (2)	38	--	7.8% (53)	5.0% (34)	0.7% (5)	92
Adult	--	1.6% (2)	0.8% (1)	2.4% (3)	6	--	0.7% (5)	0.3% (2)	0.6% (4)	11
Total	6	28	35	5	74	3	78	80	9	170

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Table C.53 presents the number of individuals and teeth affected by dental caries by age and sex. Prevalence rates among the sexes appear to be very evenly spread, with 53.3% (16) of males affected, 46.9% (23) of females, 80.0% (4) of adults of undetermined sex, and 46.7% (7) of juveniles affected by dental caries. The elements-wise prevalence rates are similar for males and females, but the adults of undetermined sex have much higher rates than other adults: 9.7% (47) for male teeth, 7.4% (68) for female teeth, and 17.4% (12) of unknowns' teeth. Only 8.7% (23) of juvenile teeth were affected.

Table C.53 Age and Sex Distribution for Dental Caries: Corrected and Elements-wise Prevalence for Sinningthwaite Priory.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	2.0% (2)	--	--	--	2	0.1% (2)	--	--	--	2
2-6	3.0% (3)	--	--	--	3	0.8% (14)	--	--	--	14
6-10	1.0% (1)	--	--	--	1	0.3% (6)	--	--	--	6
10-17	1.0% (1)	0.0% (0)	0.0% (0)	--	1	0.06% (1)	0.0% (0)	0.0% (0)	--	1
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	0.0% (0)	4.0% (4)	0.0% (0)	4	--	0.0% (0)	0.5% (8)	0.0% (0)	8
25-35	--	0.0% (0)	3.0% (3)	0.0% (0)	3	--	0.0% (0)	0.3% (5)	0.0% (0)	5
35-45	--	2.0% (2)	4.0% (4)	0.0% (0)	6	--	0.2% (3)	0.3% (6)	0.0% (0)	9
45+	--	13.1% (13)	12.1% (12)	1.0% (1)	26	--	2.6% (43)	2.8% (49)	0.1% (2)	94
Adult	--	1.0% (1)	0.0% (0)	3.0% (3)	4	--	0.06% (1)	0.0% (0)	0.6% (10)	11
Total	7	16	23	4	50	23	47	68	12	150

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

As mentioned above, it was not possible to ascertain the elements-wise prevalence rates for maxillary sinusitis for every site and so it was not done for any site as no comparisons could be made. The number of individuals affected by maxillary sinusitis is seen in Table C.54. Females had the highest prevalence rate (25% or 11 individuals), and the rate was only marginally higher than the males (20% 5 individuals). No adults of undetermined sex were affected and only 7.6% (1) of juveniles.

Table C.54 Age and Sex Distribution for Maxillary Sinusitis: Corrected and Elements-wise Prevalence for Sinningthwaite Priory.

	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0
2-6	1.2% (1)	--	--	--	1
6-10	0.0% (0)	--	--	--	0
10-17	0.0% (0)	0.0% (0)	0.0% (0)	--	0
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	0.0% (0)	0.0% (0)	1.2% (1)	0.0% (0)	1
25-35	--	0.0% (0)	0.0% (0)	0.0% (0)	0
35-45	--	0.0% (0)	1.2% (1)	0.0% (0)	1
45+	--	5.9% (5)	10.6% (9)	0.0% (0)	14
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Total	1	5	11	0	17

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The number individuals with a recorded trauma are seen in Table C.55 by age and sex, as are the number of leg bones affected. No adults of undetermined sex or juveniles had evidence of trauma, and only 16.2% (6) of males and 10.2% (6) of females. Among males, 2.1% (8) of long bones were affected and 1.1% (7) among females.

Table C.55 Age and Sex Distribution for Trauma: Corrected and Elements-wise Prevalence for Sinningthwaite Priory.

	Corrected Present 130					Elements-wise Present 1298				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	--	0.8% (0)	0.8% (1)	0.0% (0)	1	--	0.08% (0)	0.08% (1)	0.0% (0)	1
35-45	--	3.8% (1)	3.1% (1)	0.0% (0)	2	--	0.5% (1)	0.4% (1)	0.0% (0)	2
45+	--	0.0% (5)	0.0% (4)	0.0% (0)	9	--	0.0% (7)	0.0% (5)	0.0% (0)	12
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Total	0	6	6	0	12	0	8	7	0	15

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The number of individuals and the number of joint surfaces with recorded osteoarthritis are listed in Table C.56. A higher percentage of females (41) than males (27) were affected by osteoarthritis (39.1% female versus 25.8% male). Only 1% (1) of adults of undetermined sex were affected. Similarly, the number of joint surfaces affected by osteoarthritis among males make up 19.5% (101) and among females 20.2% (157), with 15.5% (9) of joint surfaces among the adults of undetermined sex.

Table C.56 Age and Sex Distribution for Osteoarthritis: Corrected and Elements-wise Prevalence for Sinningthwaite Priory.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	
	0.0%	0.0%	1.0%	0.0%		0.0%	0.0%	0.06%	0.0%	
17-25	(0)	(0)	(1)	(0)	1	(0)	(0)	(1)	(0)	1
		1.0%	1.9%	0.0%			0.06%	0.1%	0.0%	
25-35	--	(1)	(2)	(0)	3	--	(1)	(2)	(0)	3
		1.9%	4.8%	0.0%			0.1%	1.4%	0.0%	
35-45	--	(2)	(5)	(0)	7	--	(2)	(13)	(0)	15
		22.9%	31.4%	1.0%			5.8%	8.3%	0.5%	
45+	--	(24)	(33)	(1)	58	--	(98)	(141)	(9)	248
		0.0%	0.0%	0.0%			0.0%	0.0%	0.0%	
Adult	--	(0)	(0)	(0)	0	--	(0)	(0)	(0)	0
Total	0	27	41	1	69	0	101	157	9	267

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Only one individual, a male in the 45+ age category, was recorded as having evidence of DISH (3.5% of the males) (Table C.57). Almost the entire spine was affected, 19 vertebrae, which made up 4.3% of the male vertebrae present to observe.

Table C.57 Age and Sex Distribution for DISH: Corrected and Elements-wise Prevalence for Sinningthwaite Priory.

	Corrected Present					Elements-wise Present				
	J	M	F	U		J	M	F	U	
		0.0%	0.0%	0.0%			0.0%	0.0%	0.0%	
25-35	--	(0)	(0)	(0)	0	--	(0)	(0)	(0)	0
		0.0%	0.0%	0.0%			0.0%	0.0%	0.0%	
35-45	--	(0)	(0)	(0)	0	--	(0)	(0)	(0)	0
		1.0%	0.0%	0.0%			1.2%	0.0%	0.0%	
45+	--	(1)	(0)	(0)	1	--	(19)	(0)	(0)	19
		0.0%	0.0%	0.0%			0.0%	0.0%	0.0%	
Adult	--	(0)	(0)	(0)	0	--	(0)	(0)	(0)	0
Total	--	1	0	0	1	--	19	0	0	19

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Similarly, only one individual, a male in the 35-45 age group (or 3.3% of males with at least one rib present) was recorded with rib periostitis present (Table C.58).

Table C.58 Age and Sex Distribution for Rib Periostitis: Corrected and Elements-wise Prevalence for Sinningthwaite Priory.

	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0
10-17	0.0% (0)	0.0% (0)	0.0% (0)	--	0
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	--	0.0% (0)	0.0% (0)	0.0% (0)	0
35-45	--	1.0% (1)	0.0% (0)	0.0% (0)	1
45+	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Adult	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Total	0	1	0	0	1

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

C.7.2 Artefacts

As with the excavation of St James Priory, only a handful of artefacts were recovered. In the case of Sinningthwaite Priory, there were six artefacts: one axe or hammer, one buckle, three pins and the cauldron mentioned above (Figure C.20). When the cauldron was first uncovered, it was believed that it could potentially have been a 'witches' pot' or a collection of valuables (pers comm Steve Timms, 23 April 2012). A 'witches' pot' was an item thought to avert evil spirits and was usually filled with toenail clippings and urine (Barker, 2008). The cauldron found at Sinningthwaite Priory, however, had 'no contents to account for its location,' meaning that the only thing buried within the cauldron were building remnants: tile fragments, stones, mineralised wood, etc. (Barker, 2008).

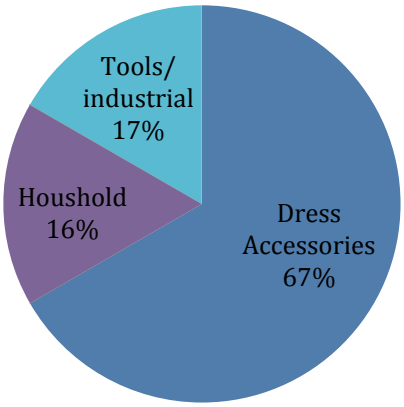


Figure C.20: Artefact Assemblage for Sinningthwaite

There were no artefacts recovered from Sinningthwaite Priory that were particularly indicative of high status or wealth. The pins were all copper, the buckle iron and the axe or hammer was stone. The cauldron itself was listed only as "metal".

C.7.3 Documents

(i) Financial

Sinningthwaite Priory was recorded as having a total gross value of £68 13s 4d at Dissolution. The prioress was granted a pension of £4 10s annually, but pensions of the nine other women are not known (VCH and Page, 1974, Dugdale and Dodsworth, 1970). As mentioned above, the priory held eight properties in the West Riding of Yorkshire, although 25 are listed in the *Monasticon Anglicanum*, but many of these were small tenancies rather than the manors, churches and chapels recorded by the List and Index Society (Jurkowski and Ramsay, 2007b, p. 611; Dugdale 1874, p. 469). At the Dissolution, the only plate owned by the priory was a gilt chalice with paten weighing only 11oz together (VCH and Page, 1974).

(ii) Lifestyle

Over the course of the life of the priory, there were two recorded apostates. The first, Agnes de Bedal, left in 1286 with no reason given for her departure and was reconciled in June. The second, Margaret de Fenton, in 1442-3, left due to a pregnancy and was granted reconciliation with mitigated penance ordered by the archbishop, as this had been her first offence. (Logan, 1996, p. 262-3). There were also numerous reminders by the archbishop that outsiders should not be allowed within the living quarters (VCH and Page, 1974). As mentioned above, there were also a few instances of the prioress having to be reminded to clothe and care for the nuns appropriately (VCH and Page, 1974).

Sinningthwaite Priory, it would seem, also functioned as a school of some kind as there are

references to the appropriate food for the children housed within the nunnery during Lent and Advent (VCH and Page, 1974). In 1319 the prioress was instructed to stop admitting new recruits and to employ a gardener to ensure that they had vegetables to eat (*ibid.)*. Similarly in 1534, shortly before Dissolution, the nuns were allowed to pledge £15 worth of jewels to keep the nunnery from being dissolved (VCH and Page, 1974). This was accompanied by the resignation of the prioress. It did not grant them much time, however, and the priory was suppressed on 3 August 1535 (VCH and Page, 1974).

C.8 Hulton Abbey, Stoke-on-Trent, Staffordshire

Male; South; Rural; Reform Order

Hulton Abbey was founded by Henry de Audley in the early part of the 13th century, some time before 1223 (VCH el at. 1970). It was a daughter house to Combermere Abbey in Cheshire, being founded to benefit the souls of the de Audley family, who remained as benefactors throughout the abbey's history (*ibid.)*.

It was always a small and poor abbey, having only five monks living within it between 1377 and 1381, with an income as low as £14 in 1354 (VCH el at. 1970). The early timber buildings were fully replaced with stone by the end of the 13th century, with some limited updating to the church being carried out in the 14th century, predominately around the windows (Klemperer and Boothroyd, 2004, p. 69). The ongoing use of a timber roof for the church and the quality of the limited brick used in the 13th century reflects the poverty of the house (*ibid.)*. It is believed to have been the smallest religious house in Staffordshire with the exception of Brewood nunnery (VCH el at. 1970).

After Dissolution, the abbey passed from family to family, operating as a farm. The buildings were rediscovered in 1854 during a period of building (Klemperer and Boothroyd, 2004, p. 6). When the cellar for the new farmhouse was being dug, a group of human remains were uncovered, meriting an article in the local advertiser (*ibid.)*. The site was again up for re-development in the 1930s under a housing development scheme. During this period of development both the chapter house and portions of the nave were uncovered (Klemperer and Boothroyd, 2004, p. 9). Additional parts of the church were uncovered during excavations in the 1950s and 60s, as well as the 1970s and early 1980s (*ibid., p. 1*0-11). See Figure C.21 for a site plan. When the school was demolished in 1987-8, another series of excavations took place from 1987-94 (*ibid.)*.

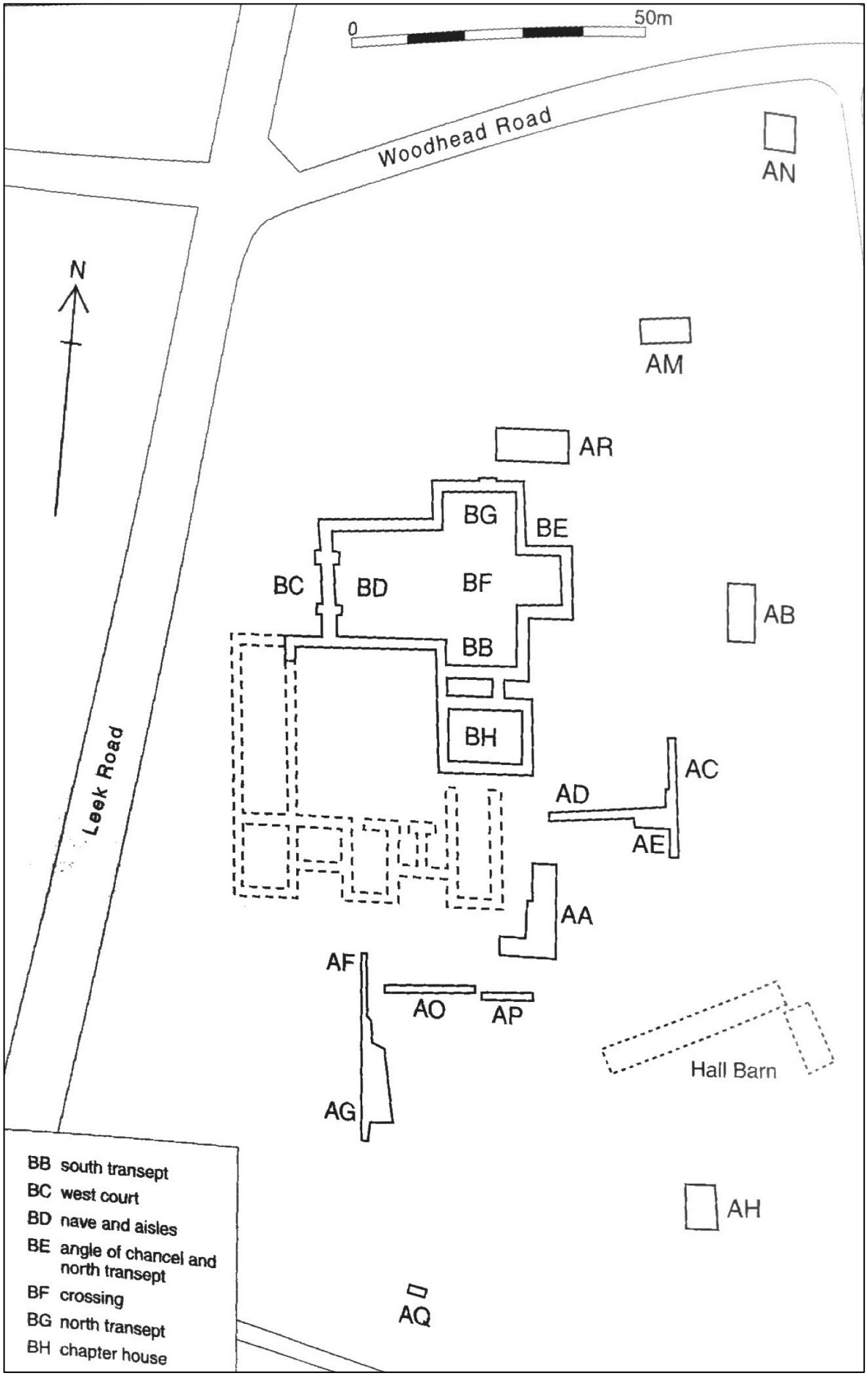


Figure C.21: Site plan for Hulton Abbey (Klemperer and Boothroyd, 2004, 14)

The archaeological data for this site were collected using the published report by Klemperer and Boothroyd and the original skeletal recording sheets of Sue Browne (Klemperer and Boothroyd, 2004; Browne, 1994).

C.8.1 Burials

(i) Demography

Out of the 91 individuals recovered during the 1987-94 excavations, 87 individuals have been included in this study, all found in medieval contexts (Browne, 2004, p. 112). The other four identified individuals were excluded because each was represented by only a single element. Thirty-eight of these individuals were identified as male, ten as possible male, three as possible female and fourteen as female, resulting in a ratio of almost 3:1 (2.8:1). There were and six adults whose sex could not be determined and sixteen juveniles (Figure C.22).

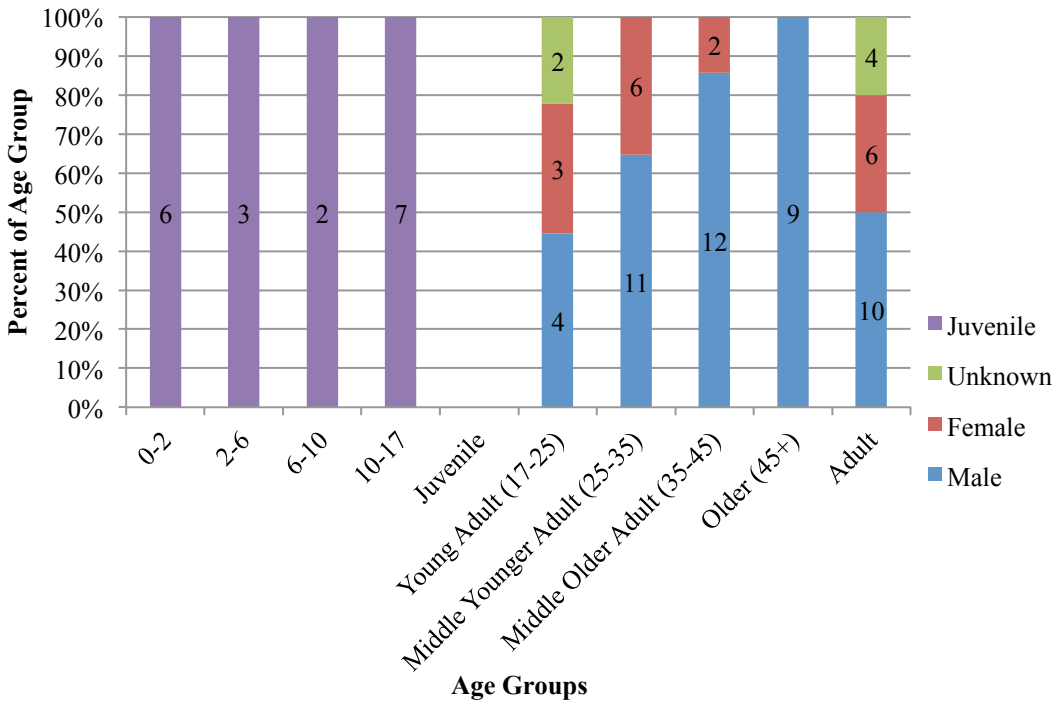


Figure C.22: Demographic for Hulton Abbey

The largest age group was the 25-35 category, followed closely by the 35-45 group. Both the 17-25 and 45+ groups were equally represented with nine individuals in each.

Males outnumber females in every age group, although the 17-25 group is almost even. There were no females identified in the 45+ age group. As discussed with some of the other monasteries above, the fact that males outnumber females overall and in every age group is not surprising, given the community from which it was drawn.

(ii) Health Indicators

The health indicator that affected the highest percentage of the individuals in this study was dental calculus with a corrected prevalence rate of 60.9% (39) and a elements-wise prevalence rate of 64% (708) (Tables C.59 and C.60).

Table C.59: Corrected Prevalence Rates for Hulton Abbey

Health Indicator	Absent	Present	Percent Affected
Calculus	25	39	60.9%
Caries	43	23	34.9%
DISH	69	2	2.8%
Maxillary Sinusitis	63	0	0.0%
Non-specific Infection	72	5	6.5%
Osteoarthritis	76	11	12.6%
Rib Periostitis	73	0	0.0%
Trauma	79	2	2.5%

Dental caries followed closely behind (23 or 34.9% of individuals and 43 or 3.9% of the teeth), with OA recorded in 12.6% (11) of the individuals and 2.1% (24) of the joint surfaces. Non-specific infection affected 6.5% (5) of the individuals in this study and 2.6% (11) of the leg bones. DISH was identified in 2.8% (2) of the individuals and 0.8% (10) of vertebrae. Evidence of trauma was found in 2.5% (2) of the cemetery population and 0.4% (3) of long bones. No individuals were recorded has having been affected by either maxillary sinusitis or rib periostitis. The age and sex distribution of these health indicators can be found below.

Table C.60: Elements-wise Prevalence Rates for Hulton Abbey

Health Indicator	Absent	Present	Percent Affected
Calculus	398	708	64.0%
Caries	1063	43	3.9%
DISH	1217	10	0.8%
Non-specific Infection	409	11	2.6%
Osteoarthritis	1115	24	2.1%
Trauma	849	3	0.4%

Far more females than males were recorded as having been affected by dental calculus, 91.6% (11) versus 68.4% (26) for corrected prevalence, and 92.2% (50) versus 67.1% (461) for elements-wise prevalence. Adults of undetermined sex had a 66.7% (2) corrected prevalence rate and a 55.6% (10) elements-wise prevalence rate (Table C.61).

Table C.61 Age and Sex Distribution for Dental Calculus: Corrected and Elements-wise Prevalence for Hulton Abbey.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	5.2% (57)	0.0% (0)	--	57
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	3.1% (2)	3.7% (3)	1.6% (1)	6	--	4.5% (50)	7.1% (78)	0.5% (5)	133
25-35	--	10.9% (7)	7.8% (5)	0.0% (0)	12	--	11.4% (126)	9.9% (109)	0.0% (0)	235
35-45	--	12.5% (8)	3.1% (2)	0.0% (0)	10	--	13.4% (148)	4.2% (47)	0.0% (0)	195
45+	--	9.4% (6)	0.0% (0)	0.0% (0)	6	--	6.1% (67)	0.0% (0)	0.0% (0)	67
Adult	--	4.7% (3)	1.6% (1)	1.6% (1)	5	--	1.2% (13)	0.3% (3)	0.5% (5)	21
Total	0	26	11	2	39	0	461	237	10	708

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Unlike dental calculus, prevalence rates among the sexes for dental caries were very similar (Table C.62). For corrected prevalence rates, 40% (16) of males were recorded with at least one dental caries and 41.7% (5) of females. There were 33.3% (1) of adults of undetermined sex with recorded dental caries and 9.1% (1) of juveniles. When elements-wise prevalence rates are calculated, 4.8% (33) of male teeth, 3.1% (8) of female teeth, and 5.6% (1) of the teeth of and adults of undetermined sex were affected. Less than 1% of juvenile teeth (1) were affected (0.69%).

Table C.62 Age and Sex Distribution for Dental Caries: Corrected and Elements-wise Prevalence for Hulton Abbey.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	1.6% (1)	3.1% (2)	0.0% (0)	--	3	0.1% (1)	0.2% (2)	0.0% (0)	--	3
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	--	1.6% (1)	1.6% (1)	0.0% (0)	2	--	0.4% (4)	0.1% (1)	0.0% (0)	5
25-35	--	9.4% (6)	3.1% (2)	0.0% (0)	8	--	1.4% (15)	0.2% (2)	0.0% (0)	17
35-45	--	0.4% (4)	1.6% (1)	0.0% (0)	5	--	0.8% (9)	0.1% (1)	0.0% (0)	10
45+	--	3.1% (2)	0.0% (0)	0.0% (0)	2	--	0.2% (2)	0.0% (0)	0.0% (0)	2
Adult	--	1.6% (1)	1.6% (1)	1.6% (1)	3	--	0.1% (1)	0.4% (4)	0.1% (1)	6
Total	1	16	5	1	23	1	33	8	1	43

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Osteoarthritis was recorded more often among the males of Hulton Abbey than the females or the adults of undetermined sex (Table C.63). The corrected prevalence rate among males was 21.7% (10) and only 5.8% (1) among females, with no adults of undetermined sex being affected. The elements-wise prevalence rates indicate that only 3.5% (23) of the joint surfaces of males were affected and less than 1% (1) of those of females (0.4%).

Table C.63 Age and Sex Distribution for Osteoarthritis Corrected and Elements-wise Prevalence for Hulton Abbey.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
17-25	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	--	1.1% (1)	0.0% (0)	0.0% (0)	1	--	0.1% (1)	0.0% (0)	0.0% (0)	1
35-45	--	2.3% (2)	0.0% (0)	0.0% (0)	2	--	0.3% (3)	0.0% (0)	0.0% (0)	3
45+	--	3.4% (3)	0.0% (0)	0.0% (0)	3	--	14.9% (13)	0.0% (0)	0.0% (0)	13
Adult	--	4.6% (4)	1.1% (1)	0.0% (0)	5	--	0.5% (6)	0.1% (1)	0.0% (0)	7
Total	0	10	1	0	11	0	23	1	0	24

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Evidence of non-specific infection was found at Hulton Abbey, with a single juvenile being affected. With regard to corrected prevalence rates, males (3 or 6.4%) and females (1 or 6.7%) were similarly affected (Table C.64). For elements-wise prevalence rates, females had the highest rate (4 or 4.5% of leg bones), with juveniles having 3.0% (2) affected and males having 1.9% (5) affected.

Table C.64 Age and Sex Distribution for Non-Specific Infection: Corrected and Elements-wise Prevalence for Hulton Abbey.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	
0-2	1.3% (1)	--	--	--	1	0.5% (2)	--	--	--	2
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	0.0% (0)	1.3% (1)	0.0% (0)	0.0% (0)	1	0.0% (0)	0.7% (3)	0.0% (0)	0.0% (0)	3
25-35	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
35-45	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
45+	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Adult	--	2.6% (2)	1.3% (1)	0.0% (0)	3	--	0.5% (2)	1.0% (4)	0.0% (0)	6
Total	1	3	1	0	5	2	5	4	0	11

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

Only two individuals were recorded as having been affected by DISH at Hulton Abbey, both males (5.0% of males) in the Adult age category (Table C.65). Each was recorded with five vertebrae affected (0.8%), the minimum number for diagnosis, as suggested by Rogers and Waldron (2001).

Table C.65 Age and Sex Distribution for DISH: Corrected and Elements-wise Prevalence for Hulton Abbey.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
25-35	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
35-45	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
45+	--	0.0% (0)	0.0% (0)	0.0% (0)	0	--	0.0% (0)	0.0% (0)	0.0% (0)	0
Adult	--	2.8% (2)	0.0% (0)	0.0% (0)	2	--	0.8% (10)	0.0% (0)	0.0% (0)	10
Total	--	2	0	0	2	--	10	0	0	10

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

The final health indicator to be discussed is that of trauma. The only individuals to be recorded with evidence of trauma injury at Hulton Abbey were two males (Table C.66). The corrected prevalence rate for the males, and is 4.3% with an elements-wise prevalence rate of 0.5% (3).

Table C.66 Age and Sex Distribution for Trauma: Corrected and Elements-wise Prevalence for Hulton Abbey.

	Corrected Present					Elements-wise Present				
	J	M	F	U	T	J	M	F	U	T
0-2	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
2-6	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
6-10	0.0% (0)	--	--	--	0	0.0% (0)	--	--	--	0
10-17	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
Juvenile	0.0% (0)	0.0% (0)	0.0% (0)	--	0	0.0% (0)	0.0% (0)	0.0% (0)	--	0
17-25	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
25-35	--	1.2% (0)	0.0% (0)	0.0% (0)	0	--	0.1% (0)	0.0% (0)	0.0% (0)	0
35-45	--	0.0% (1)	0.0% (0)	0.0% (0)	1	--	0.0% (1)	0.0% (0)	0.0% (0)	1
45+	--	1.2% (0)	0.0% (0)	0.0% (0)	0	--	0.2% (0)	0.0% (0)	0.0% (0)	0
Adult	--	(1)	(0)	(0)	1	--	(2)	(0)	(0)	2
Total	0	2	0	0	2	0	3	0	0	3

The percentage represents the percent of individuals/elements affected in this age group out of the measurable portion of the population, while the actual number of individuals/elements is included in parentheses.

C.8.2 Artefacts

A total of 77 artefacts make up the artefact assemblage for Hulton Abbey (See Figure C.23). A large proportion of these were dress accessories (41 or 53%), primarily being made up of strap and lace ends, buckles, mounts, pins and some remains of shoes. The next largest artefact group was that of religious items (9 or 12%) made up of a variety of items including beads, several lead adornments (badges and crosses) as well as a beeswax chalice that was found buried with a 35-45 year old male (individual 50048). The Money artefact class is the next largest, making up 10% (8) of the total assemblage, and is primarily made up of jettons, although there were also two pennies.

Both the Household (6) and Writing/Reading (6) classes made up 8% of the total. The Household class was made up of several keys, a knife handle and some vessel fragments. The Writing/Reading class was dominated by book accoutrements and a few styli. The Tools/Industrial (1) class made up 2% of the total, as did the Horse class (1), which comprised a single chisel and a bridle fitting. There was also only one artefact in the Timekeeping class, a single clock weight.

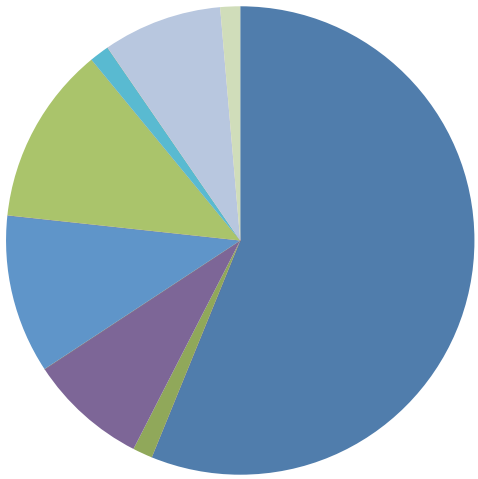


Figure C.23: Artefact Assemblage for Hulton Abbey

The artefacts which could be argued to indicate high status or wealth include the beeswax chalice, a symbol of possible religious office, and possibly the religious badges, as they could indicate the ability of certain individuals to undertake pilgrimages (Gilchrist and Sloane, 2005, p. 96-8). The two beads found at the site were made of amber, which, as discussed above, were considered to be socially and religiously significant.

C.8.3 Documents

(i) Financial

As mentioned above, Hulton Abbey was never a wealthy house and had a total gross value of £87 10s 1½ d at Dissolution. The Abbot, however, was granted a pension of £20 and, although the total pensions granted to the eight monks still in residence at Dissolution are unknown, at least two of them were granted pensions of £4 (VCH el at. 1970). They held three churches, four manors, a grange and four other properties in two counties (Lincoln and Staffordshire) (Record Commission 1894 107-8).

(ii) Lifestyle

The majority of surviving records relating to Hulton Abbey are focused on the poverty of the house, although there were several internal disputes. There was an incident in 1386 in which the king ordered the arrest of one of the monks who had left the monastery, who was then excommunicated leading up to his arrest (Logan, 1996, p. 210; VCH el at. 1970). One of the abbots, Richard Billington, was accused of abducting a servant woman and another was accused of attempting to control the local town, but countered with charges of assault against a local smithy (*ibid.)*. In 1344, Thomas de Koel, a monk of the house, using an armed band, forced the abbot to resign and placed a monk of his own choosing in his place (Logan, 1996, p. 207).

1611a. The Book of Job. *The Holy Bible, King James Version.* Cambridge: Cambridge University Press.

1611b. The Book of Proverbs. *The Holy Bible, King James Version.* Cambridge: Cambridge University Press.

1611c. The Epistle of Paul the Apostle to the Galatians. *The Holy Bible, King James Version.* Cambridge: Cambridge University Press.

1611d. The Epistle of Paul the Apostle to the Romans. *The Holy Bible, King James Version.* Cambridge: Cambridge University Press.

1611e. The First Epistle General of Peter. *The Holy Bible, King James Version.* Cambridge: Cambridge University Press.

1611f. The First Epistle of Paul the Apostle to the Corinthians. *The Holy Bible, King James Version.* Cambridge: Cambridge University Press.

1611g. The Gospel According to Saint Luke. *The Holy Bible, King James Version.* Cambridge: Cambridge University Press.

1611h. The Gospel According to Saint Matthew. *The Holy Bible, King James Version.* Cambridge: Cambridge University Press.

1973. Nunnaminster Small Finds. Winchester: Winchester Museums Service.

1976-7. Clementhorpe Small Finds Register. York: York Archaeological Trust.

1981-3. Nunnaminster Small Finds. Winchester: Winchester Museums Service.

2009. Sinningthwaite Small Finds. York: Mike Griffiths and Associates Ltd.

Abelard, P. 1995. *Ethical Writings: His Ethics Or "Know Yourself" and His Dialogue Between a Philosopher, a Jew, and a Christian / Peter Abelard; Translated By Paul Vincent Spade; with an Introduction By Marilyn McCord Adams,* Indianapolis: Hackett Pub. Co.

Albarella, U. & Thomas, R. 2002. They Dined on Crane: Bird Consumption, Wild Fowling and Status in Medieval England. *Acta Zoologica Cracoviensia,* 45**,** 23-38.

Albarella, U. 2005. Meat Consumption and Production in Town and Country. *in:* Giles, K. & Dyer, C. (Eds.) *Town and Country in the Middle Ages: Contrasts, Contacts and Interconnections, 1100-1500.* Leeds: Maney.

Ambrose, K. 2006. A Medieval Food List from the Monastery of Cluny. *Gastronimica: The Journal of Food and Culture,* 6**,** 14-20.

Ambrose, S., 1996. *On Virginity (De Virginitate),* Toronto, Peregrina Publishing.

Ambrose, S. 1972. *Seven Exegetical Works: Isaac, Or the Soul, Death As Good, Jacob and the Happy Life, Joseph, the Patriarchs, Flight from the World, the Prayer of Job and David,* Washington, DC, Catholic University of America Publishing.

Andrews, P. & Fernandez-Jalvo, Y. 2012. Bronze Age Barrows at Longstone Edge: Taphonomy and Site Formation. *Quaternary International,* 275**,** 43-54.

Anonymous 1968. *Jack Upland; Friar Daw's Reply; Upland's Rejoinder / Edited By P.L. Heyworth,* London: Oxford University Press.

Anonymous 1988a. *Bel E Doette,* South Hadley, MA, The Medieval Lyric.

Anonymous 1988b. *Lament of a Nun,* South Hadley, MA, The Medieval Lyric.

Anonymous 1995. *Land of Cokaygne,* Blackrock, Co. Dublin: Columba Press.

Anonymous 2006. Garbage Removal in English Towns, 1385. *in:* Kowalekski, M. (Ed.) *Medieval Towns: A Reader.* Peterborough: Broadview Press.

Anselm, S., 2008. *Selections. English,* Oxford: Oxford University Press.

Apley, A. G. & Solomon, L. 2000. *Concise System of Orthopaedics and Fractures, Second Edition,* London, Arnold.

Aquinas, T. 1993. *Selected Philosophical Writings / Thomas Aquinas; Selected and Translated By Timothy McDermott,* Oxford: Oxford University Press.

Aristotle 2000. Nicomachean Ethics. *in:* Crisp, R. (Ed.). Cambridge: Cambridge University Press, Ebook Collection (Ebscohost), Ebscohost, Viewed 24 July 2012.

Aristotle. 1986. *De Anima. English,* Harmondsworth: Penguin Books.

Vann Arsdall, A. 2002. *Medieval Herbal Remedies: The Old English Herbarium and Anglo-Saxon Medicine,* New York, Routledge.

Asad, T. 1983. Notes on Body Pain and Truth in Medieval Christian Ritual. *Economy and Society,* 12**,** 287

Aspelin, P., Ekberg, O., Thorsson, O., Wilhelmsson, M. & Westlin, N. 1992. Ultrasound Examination of Soft Tissue Injury of the Lower Limb in Athletes. *American Journal of Sports Medicine,* 20**,** 601-603.

Audit Commission 2002. *Quality of Life: Using Quality of Life Indicators,* London: Audit Commission.

Audit Commission 2005. *Quality of Life.* London: Audit Commission.

Austad, S. N. 2006. Why Women Live Longer Than Men: Sex Differences in Longevity. *Gender Medicine,* 3**,** 79-92.

Avicenna 1930. *A Treatise on the Canon of Medicine (Al-Qānūn Fī Al-Ṭibb. English.),* London, Luzac & Co.

Baker, D. ND. Elstow Small Finds Register. Bedford.

Banks, M. 1904. *Alphabetum Narrationum. English,* London: K. Paul, Trench, Trubbner & Co.

Barker, K. 2008. Syningthwaite Priory Cauldron. Hexham: Antiquities Conservation Service.

Bartosiewicz, L. 2008. Taphonomy and Palaeopathology in Archaeozoology. *Geobios,* 41**,** 69-77.

Bass, W. M. 1987. *Human Osteology: A Laboratory and Field Manual of Human Skeleton,* Springfield, Missouri Archaeological Society.

Baxter, M. J. 2003. *Statistics in Archaeology / Michael Baxter,* London: Arnold.

Beldomenico, P. M., Telfer, S., Gebert, S., Lukomski, L., Bennett, M. & Begon, M. 2008. Poor Condition and Infection: A Vicious Circle in Natural Populations. *Proceedings of the Royal Society of Biology Sciences,* 275**,** 1753-1759.

Bell, D. 1995. *What Nuns Read: Books and Libraries in Medieval English Nunneries,* Kalamazoo, Cistercian Publications.

Bell, D. 2007. What Nuns Read: The State of the Question. *in:* Clark, J. G. (Ed.) *The Culture of Medieval English Monasticism.* Woodbridge: The Boydell Press.

Bell, R. M. 1985. *Holy Anorexia.* Chicago: University of Chicago Press.

Benedict, S., Abbot of Monte Cassino. 1990. *The Rule of Saint Benedict / [Translated By] Abbot Parry & [Introduction By] Esther De Waal,* Leominster: Gracewing.

Berman, C. H. 2000. The 'Labours of Hercules', the Cartulary, Church and Abbey for Nuns of La Cour-Notre-Dame-De-Michery. *Journal of Medieval History,* 26**,** 33-70.

Bernard, O. C. 1971-80. *On the Song of Songs (Sermones Super Cantica Canticorum. English.),* Spencer, Cistercian Publications.

Bird, C. E. & Rieker, P. P. 1999. Gender Matters: An Integrated Model for Understanding Men's and Women's Health. *Social Science and Medicine,* 48**,** 745-755.

Boccaccio, G. 2008. *Decameron,* Richmond, Oneworld Classics.

Bonaventure, S. 1947. *Breviloquium,* London, B Herder Book Company.

Bond, C. J. 2001. Production and Consumption of Food and Drink in the Medieval Monastery. *in:* Keevil, G., Aston, M. & Hall, T. (Eds.) *Monastic Archaeology.* Oxford: Oxbow.

Bond, C. J. 2003. English Medieval Nunneries: Buildings, Precincts, and Estates. *in:* Wood, D. (Ed.) *Women and Religion in Medieval England.* Oxford: Oxbow Books.

Bond, J. 2004. *Monastic Landscapes.* Stroud: Tempus.

Bowling, A. 1997. *Measuring Health: A Review of Quality of Life Measurement Scale,* Buckingham, Open University Press.

Brandon, P. 1971. Late-Medieval Weather in Sussex and Its Agricultural Significance. *Transactions of the Institute of British Geographers,* 54**,** 1-17.

Brännvall, M. L., Bindler, R., Renberg, I., Emteryd, O., Bartnicki, J. & Billström, K. 1999. The Medieval Metal Industry Was the Cradle of Modern Large-Scale Atmospheric Lead Pollution in Northern Europe. *Environmental Science Technology,* 33**,** 4391-4395.

Brickley, M. & McKinley 2004. Guidelines to the Standards for Recording Human Remains IFA Paper No. 7. *in:* BABAO (Ed.). Southampton: Institute of Field Archaeologists.

Brimblecombe, P. 1987. *The Big Smoke: A History of Air Pollution in London Since Medieval Times*. Methusen, New. York

Brimblecombe, P. 1975. Industrial Air Pollution in Thirteenth-Century Britain. *Weather,* 30**,** 388- 396.

Brinklow, D. A., Dawes, J. D. & Donaghey, S. 1977. Structural and Burial Evidence for The Nunnery of St Clement, Clementhorpe. York: York Archaeological Trust.

Brooks, S. & Suchey, J. M. 1990. Skeletal Age Determination Based on the Os Pubis: A Comparison of the Acsadi-Nemeskeri and Suchey-Brooks Methods. *Human Evolution,* 5**,** 227-238.

Brothwell, D. 1981 *Digging Up Bones: the Excavation, Treatment and Study of Human Skeletal Remains,* Ithaca, Cornell University Press.

Brown, D. H. 1997. The Social Significance of Imported Medieval Pottery. *in:* Cumberpath, C. G. & Blinkhorn, P. W. (Eds.) *Not So Much a Pot, More a Way of Life: Current Approaches to Artefact Analysis in Archaeology.* Oxford: Oxbow.

Brown, P. 1988. *The Body and Society: Men, Women and Sexual Renunciation in Early Christianity,* New York, Columbia University Press.

Browne, S. 1986a. Nunnaminster Skeletal Recording Forms. Winchester: Winchester Museums Service.

Browne, S. 1986b. Report on the Human Bone from St Mary's Abbey, Winchester, Hampshire. Winchester: Winchester Museums Service.

Browne, S. 1994. Hulton Abbey Skeletal Recording Sheets. Stoke-on-Trent.

Browne, S. 2004. Human Remains. *in:* Klemperer, W. D. & Boothroyd, N. (Eds.) *Excavations at Hulton Abbey, Staffordshire 1987-1994.* Leeds: Maney Publishing.

Brundage, J. A. & Makowski, E. M. 1994. Enclosure of Nuns: The Decretal *Periculoso* and Its Commentators. *Journal of Medieval History,* 20.

Buikstra, J. E. & Ubelaker, D. H. 1994. *Standards for Data Collection from Human Skeletal Remains.*

Büntgan, U., Tegel, W., Nicolussi, K., Mccormick, M., Frank, D., Trouet, V., Kaplan, J. O., Herzig, F., Heussner, K., Wanner, H., Luterbacher, J. & Esper, J. 2011. 2500 Years of European Climate Variability and Human Susceptibility. *Science,* 331.

Burton, J. 1994. *Monastic and Religious Orders in Britain, 1000-1300*. Cambridge: Cambridge University Press.

Burton, J. 1979. The Yorkshire Nunneries in the Twelfth and Thirteenth Centuries. *Borthwick Papers,* 56.

Butler, S. 2006. Runaway Wives: Husband Desertion in Medieval England. *Journal of Social History*. 40 (2) 337-359.

Butler, S. M. & Snowdon, D. A. 1996. Trends in Mortality in Older Women: Findings from the Nun Study. *Journal of Gerontology: Psychological Science and Social Science,* 51**,** 201-208.

Butterfield, A. 2002. *Poetry and Music in Medieval France: From Jean Renart to Guillaume De Machaut,* Cambridge, Cambridge University Press.

Bynum, C. W. 1987. *Holy Feast and Holy Fast: The Religious Significance of Food to Medieval Women / Caroline Walker Bynum,* Berkeley: University of California Press.

Bynum, C. W. 1991 *Fragmentation and Redemption: Essays on Gender and the Human Body in Medieval Religion.* New York: Zone Books.

Bynum, C.W. and Freedman, P. (Eds.) 2000. *Last things: death and the Apocalypse in the Middle Ages.* Philadelphia: University of Pennsylvania Press.

Cadden, J. 1993. *Meanings of Sex Difference in the Middle Ages: Medicine, Science, and Culture / Joan Cadden,* Cambridge: Cambridge University Press.

Cameron, N. 1991. Human Growth, Nutrition, and Health Status in Sub-Saharan Africa. *Yearbook of Physical Anthropology,* 34**,** 211-250.

Capasso, L. 2000. Indoor Pollution and Respiratory Disease in Ancient Rome. *The Lancet,* 356.

Carrott, J., Dobney, K., Hall, A., Irving, B., Issitt, M., Jaques, D., Kenward, H., Large, F., Mckenna, B., Milles, A., Shaw, T. & Usai, R. 1998. Assessment of Biological Remains and Sediments. *in:* Evans, D. (Ed.) *The Post-Excavation Assessment and Updated Project Design for the Hull Magistrates Courts Site.* Hull.

Castilhos, E de., Horta, B., Gigante, D., Demarco, F., Peres, K. & Peres, M. 2012. Association Between Obesity and Periodontal Disease in Young Adults: A Population-Based Birth Cohort. *Journal of Clinical Periodontology,* DOI: 10.1111/J.1600-051x.2012.01906.X.

Chamberlain, A. T. 2006. *Demography in Archaeology / Andrew T. Chamberlain,* Cambridge: Cambridge University Press.

Chaucer, G. D. 1894. *Works,* Oxford: Clarendon Press.

Cheng, K. K., Chalmers, I. & Sheldon, T. A. 2007. Adding Fluoride to Water Supplies. *British Medical Journal,* 335**,** 699-702.

Clark, J. 2004. *The Medieval Horse and Its Equipment, C.1150-C.1450,* Woodbridge, The Boydell Press.

Cleveland Museum of Natural History 2011. *Hamann-Todd Human Osteological Collection* [Online]. Available: http://www.cmnh.org/site/researchandcollections/physicalanthropology/collections/hamann-toddcollection.aspx [Accessed 12 December 2011].

Communities., S. O. O. T. E. 1995. *Cost-of-Living Comparisons in the European Union / Statistical office of the European Communities,* Luxembourg: office for official Publications of the European Communities.

Cool, H. & Baxter, M. 1999. Peeling the Onion; An Approach to Comparing Vessel Glass Assemblages. *Journal of Roman Archaeology,* 12**,** 72-100

Cooper, C., Inskip, H., Croft, P., Campbel, L., Smith, G., Mclaren, M. & Coggon, D. 1998. Individual Risk Factors for Hip Osteoarthritis: Obesity, Hip Injury, and Physical Activity. *American Journal of Epidemiology,* 147**,** 516-22.

Cooper, T. P. 1913. The Medieval Highways, Streets, Open Ditches and Sanitary Conditions of the City of York. *Yorkshire Archaeological Journal,* 22**,** 270-86.

Coppack, G. 1990. *English Heritage Book of Abbeys and Priories,* London, Batsford/English Heritage.

Cowal, L. S. & Pastor, R. F. 2008. Dimensional Variation in the Proximal Ulna: Evaluation of a Metric Method for Sex Assessment. *American Journal of Physical Anthropology,* 135**,** 469-478.

Cox, M. & Scott, A. 1992. Evaluation of the Obstetric Significance of Some Pelvic Characters in an 18th Century British Sample of Known Parity Status. *American Journal of Physical Anthropology,* 89**,** 431-440.

Crabtree, P. J. 1990. Zooarchaeology and Complex Societies: Some Uses of Faunal Analysis for the Study of Trade, Social Status, and Ethnicity. *in:* Schiffer, M. B. (Ed.) *Archaeological Method and Theory.* Tucson University of Arizona Press.

Curet, L. A. & Pestle, W. J. 2010. Identifying High-Status Foods in the Archaeological Record. *Journal of Anthropological Archaeology,* 29**,** 413-431.

Davies, D. V. & Davies, F. 1962. *Gray's Anatomy,* London Longmans, Green & Co. Ltd.

Davis, J. 2004. Baking for the Common Good: A Reassessment of the Assize of Bread in Medieval England. *The Economic History Review,* 57**,** 465-502.

Dawes, J. D. & Magilton, J. R. 1980. The Cemetery of St Helen-on-the-Walls, Aldward. *The Archaeology of York,* 12: The Medieval Cemeteries.

Dawes, J. D. 1976-7. Clementhorpe Skeletal Recording Sheets. York: York Archaeological Trust.

De Gouw, J. W. F. M., Westendorp, K. G. J., Kunst, A. E., Mackenbach, J. P. & Vandenbroucke, J. P. 1995. Decreased Mortality Among Contemplative Monks in the Netherlands. *American Journal of Epidemiology,* 141**,** 771-775.

De Meere, J. M. M. 1982. *Economische Ontwikkeling En Levensstandaard in Nederland Gedurende De Eerste Helft Van De Negentiende Eeuw,* S-Gravenhage, Nijhoff.

Dabeka, R. W. & McKenzie, A. D. 1995. Survey of Lead, Cadmium, Fluoride, Nickel, and Cobalt in Food Composites and Estimation of Dietary Intakes of These Elements By Canadians in 1986-1988. *Journal of Aoac International,* 78**,** 897-909.

Department of Health (DOH), 2010. Liberating the NHS: Transparency in Outcomes - A Framework for the NHS.

Dettwyler, K. A. 1991. Can Paleopathology Provide Evidence for "Compassion"? *American Journal of Physical Anthropology,* 84**,** 375-384.

Dettwyler, K. A. 1991. Can Paleopathology Provide Evidence for "Compassion"? *American Journal of Physical Anthropology,* 84**,** 375-384.

Devos, Y., Vrydaghs, L., Degraeve, A. & Fechner, K. 2009. An Archaeopedological and Phytolitarian Study of the "Dark Earth" on the Site of Rue De Dinant (Brussels, Belgium). *Catena,* 78**,** 270-284.

Dewitte, S. N. & Bekvalac, J. 2010. Oral Health and Frailty in the Medieval English Cemetery of St Mary Graces. *American Journal of Physical Anthropology* 142(3) 341–354.

Dibble, H., Raczek, T. P. & McPherron, S. P. 2005. Excavator Bias at the Site of Pech De L'aze Iv, France. *Journal of Field Archaeology,* 30**,** 317-328.

Dobson, R. B. & Donaghey, S. 1984. *The History of Clementhorpe Nunnery,* York, William Sessions Ltd.

Dolgin, B., Bulatov, V. & Schechter, I. 2007. Non-Destructive Assessment of Parchment Deterioration By Optical Methods. *Analytical and Bioanalytical Chemistry,* 388**,** 1885-1896.

Doody, M. M., Mandel, J. S., Linet, M. S., Ron, E., Lubin, J. H., Boice, J. D. & Fraumeni, J. F. 2000. Mortality Among Catholic Nuns Certified As Radiologic Technologists. *American Journal of Industrial Medicine,* 37.

Dressler, W. W. & Bindon, J. R. 1997. Social Status, Social Context, and Arterial Blood Pressure. *American Journal of Physical Anthropology,* 102**,** 55-66.

Duffy, E. 2001. *The Voices of Morebath: Reformation & Rebellion in an English Village,* Boston, Yale University Press.

Dugdale, W. & Dodsworth, R. 1970. *Monasticon Anglicanum.* London.

Dutour, O; Palfi Gy Berato J Brun JP 1994. L'origine De La Syphilis En Durope: Avant Or Apres 1493? Errance, Parris.

Dyer, C. 1998. Did the Peasants Really Starve in Medieval England. *in:* Carlin, M. & Rosenthal, J. T. (Eds.) *Food and Eating in Medieval Europe.* London: The Hambledon Press.

Dyer, C. 2006. Seasonal Patterns in Food Consumption in the Later Middle Ages. *in:* Woolgar, C., Serjeantson, D. & Waldron, T. (Eds.) *Food in Medieval England: Diet and Nutrition.* Oxford: Oxford University Press.

Dyer, C. 2009. *Making a Living in the Middle Ages: The People of Britain 850-1520,* New Haven, Yale University Press.

Dyer, C. 1998. Did the Peasants Really Starve in Medieval England. *in:* Carlin, M. & Rosenthal, J. T. (Eds.) *Food and Eating in Medieval Europe.* London: The Hambledon Press.

Dyer, C. 1989. *Standards of Living in the Later Middle Ages: Social Change in England C. 1200-1520,* Cambridge: Cambridge Univ. P.

Eckermann, L. 2000. Gendering Indicators of Health and Well-Being: Is Quality of Life Gender Neutral? *Social Indicators Research,* 52**,** 29-54.

Edward II 2006. A King's Concern. *in:* Kowalekski, M. (Ed.) *Medieval Towns: A Reader.* Peterborough: Broadview Press.

Edwards, J. and Hindle, B. 1991. 'The transportation system of medieval England and Wales', *Journal of Historical Geography* 17(2), 123-34.

Egan, G. 1998. *The Medieval Household Daily Living C. 1150-C. 1450,* London, The Stationary Office.

Egan, G. and F Prichard 1991. *Dress Accessories C.1150-C.1450* London: HMSO.

Eisenberg, L. E. 1991. Interpreting Measures of Community Health During the Late Prehistoric Period in Middle Tennessee: A Biocultural Approach. *British Archaeological Reports (Bar),* 567**,** 115-128

Eisner, M. 2003. Long-Term Historical Trends in Violent Crime. *Crime and Justice,* 30**,** 83-142.

Erasmus, D., D. 1877. *Colloquia. English,* London: Hamilton, Adams & Co.

Erdal, S. & Buchanan, S. N. 2005. A Quantitative Look at Fluorosis, Fluoride Exposure, and Intake in Children Using a Health Risk Assessment Approach. *Environmental Health Perspectives,* 113**,** 111-117.

Erler, M. C. 2007. Private Reading in the Fifteenth- and Sixteenth-Century English Nunnery. *in:* Clark, J. G. (Ed.) *The Culture of Medieval English Monasticism.* Woodbridge: Boydell & Brewer Inc.

Evans, D. 1998. The Post-Excavation Assessment and Updated Project Design for the Hull Magistrates Courts Site. Hull: Humber Archaeology Partnership.

Evans, D. ND Hull Magistrates Court Small Finds. Hull: Hull County Council.

Evans, J. & O'Connor, T. 2001. *Environmental Archaeology: Principles and Methods,* Stroud, Sutton Publishing Ltd.

Evans, K. L. 1994. Diagnosis and Management of Sinusitis. *British Medical Journal,* 309**,** 1415-1422.

Eyler, W., Monsein, L. H., Beute, G. H., Tilley, B., Schultz, L. R. & Schmitt, W. G. H. 1996. Rib Enlargement in Patients with Chronic Pleural Disease. *American Journal of Rheumatology,* 167**,** 921-926.

Faccia, K. & Williams, R. 2008. Schmorl's Nodes: Clinical Significance and Implications for the Bioarchaeological Record. *International Journal of Osteoarchaeology,* 18**,** 28-44.

Farmer, S. A. 2002. *Surviving Poverty in Medieval Paris: Gender, Ideology, and the Daily Lives of the Poor,* Ithaca; London: Cornell University Press.

Fayers, P. M. and D Machin 2000. *Quality of Life: Assessment, Analysis and Interpretation,* Chichester: Wiley.

Fischman, S. L. 1997. The History of Oral Hygiene Products: How Far Have We Come in 6000 Years? *Periodontology 2000,* 15**,** 7-14.

Fitzralph, R. 1925. *Dialogus Inter Militem Et Clericum,* London, Publisher for the Early English Text Society, Oxford University Press.

Fitzstephen, W. 2006. A Description of London. *in:* Kowalekski, M. (Ed.) *Medieval Towns: A Reader.* Peterborough: Broadview Press.

Flannelly, K. J., Weaver, A. J., Larson, D. B. & Koenig, H. G. 2002. A Review of Mortality Research on Clergy and Other Religious Professionals. *Journal of Religion and Health,* 41**,** 57-68.

Fraumeni, J. F., Lloyd, J. W., Smith, E. M. & Wagoner, J. K. 1969. Cancer Mortality Among Nuns: Role of Marital Status in Etiology of Neoplastic Disease in Women. *Journal of the National Cancer Institute,* 42**,** 455-468.

Freedman, P. 2005. Spices and Late-Medieval European Ideas of Scarcity and Value. *Speculum,* 80**,** 1209-1227.

French, C., Davies, M. & Heathcote, J. 1999. Hydrological Monitoring of an Alluviated Landscape in the Lower Great Ouse Valley, Cambridgeshire: Interim Results of the First Three Years. *Environmental Archaeology,* 4**,** 41-56.

French, R. 2003. *Medicine Before Science: The Business of Medicine from the Middle Ages to the Enlightenment,* Cambridge, Cambridge University Press.

Galen 1928. *On the Natural Faculties,* London, William Heinemann.

Galloway, J. A. 2009. Storm Flooding, Coastal Defense and Land Use Around the Thames Estuary and Tidal River C.1250-1450. *Journal of Medieval History,* 35**,** 171-188.

Galloway, J. 2001. Town and Country in England, 1300-1570. *in:* Epstein, S. (Ed.) *Town and Country in Europe, 1300-1800.* Cambridge: Cambridge University Press.

Gangwisch JE; Malaspina D; Boden-Albala B et al. 2005 Inadequate sleep as a risk factor for obesity: analyses of the NHANES I. *Sleep* 28, 1289-1296.

Gaunt, S. 2006. *Love and Death in Medieval French and Occitan Courtly Literature: Martyrs to Love,* Oxford, Oxford University Press.

Geller, P. L. 2008. Conceiving Sex: Fomenting a Feminist Bioarchaeology. *Journal of Social Archaeology,* 8**,** 113-138.

Gerard of Wales 1979 *Gemma Ecclesiastica. English,* Lugduni Batavorum: Brill.

Gerwin, W. & Baumhauer, R. 2000. Effect of Soil Parameters on the Corrosion of Archaeological Metal Finds. *Geoderma,* 96**,** 63-80.

Gilbert, B. M. & McKern, T. W. 1973. A Method for Ageing the Female *Os Pubis*. *American Journal of Physical Anthropology,* 38**,** 31-38.

Gilchrist, R. & Sloane, B. 2005. *Requiem: The Medieval Monastic Cemetery in Britain,* London, Museum of London Archaeology Services.

Gilchrist, R. 1994. *Gender and Material Culture: The Archaeology of Religious Women,* London, Routledge.

Gilchrist, R. 1997. *Gender and Material Culture: The Archaeology of Religious Women* London: Center for Archaeological Investigations, Southern Illinois University at Carbondale

Gilchrist, R. 2012. *Medieval Life: Archaeology and the Life Course,* Woodbridge, The Boydell Press.

Gilmour, I. M., Daniels, M., Mccrillis, R. C., Winset, D. & Selgrade, M. K. 2001. Air Pollutant-Enhanced Respiratory Disease in Experimental Animals. *Environmental Health Perspectives,* 109**,** 619-622.

Gimpel, J. 1976. *The Medieval Machine: The Industrial Revolution of the Middle Ages,* New York, Barnes and Noble Books.

Ginther, J. R. 1998. *Medieval Philosophy / Ed. By J.Marenbon The Westminster Handbook to Medieval Theology.* London: Westminster John Knox Press.

Giraldus, C. 1978. *Itinerarium Cambriae: The Journey through Wales,* Harmondsworth, Penguin.

Given, J. B. 1977. *Society and Homicide in Thirteenth-Century England,* Stanford, Stanford University Press.

Glennie, P. D. 2001. Town and Country in England, 1570-1750. *in:* Epstein, S. (Ed.) *Town and Country in Europe, 1300-1800.* Cambridge: Cambridge University Press.

Gnaden, D. & Holdaway, S. 2000. Understanding Observer Variation When Recording Stone Artifacts. *American Antiquity,* 65**,** 739-747.

Goldberg, P. 2008. The Fashioning of Bourgeois Domesticity in Later Medieval England: a Material Culture Perspective. *in:* Kowalekski, M. & Goldberg, P. (Eds.) *Medieval Domesticity: Home, Housing and Household in Medieval England.* Cambridge: Cambridge University Press.

Goodman, A. H. & Leatherman, T. L. 1998. *Building a New Biocultural Synthesis: Political-Economic Perspectives on Human Biology* Ann Arbor: University of Michigan Press.

Goodman, A. H. 1993. On the Interpretation of Health from Skeletal Remains. *Current Anthropology,* 34**,** 281-288.

Goodman, A. H. 1998. The Biological Consequences of Inequality in Antiquity. *in:* Goodman, A. H. & Leatherman, T. L. (Eds.) *Building a New Biocultural Synthesis: Political-Economic Perspectives on Human Biology.* Ann Arbor: The University of Michigan Press.

Gordon, C. C. & Buikstra, J. E. 1981. Soil Ph., Bone Preservation, and Sampling Bias at Mortuary Sites. *American Antiquity,* 46**,** 566-571.

Gordon, E. A. 1993. Screen Size and Differential Faunal Recovery: A Hawaiian Example. *Journal of Field Archaeology,* 20**,** 453-460.

Goto, S., Tanno, T. & Moriya, H. 1995. Cervical Myelopathy Caused By Pseudoarthrosis Between the Atlas and Axis Associated with Diffuse Idiopathic Skeletal Hyperostosis. *Spine,* 20**,** 2572-2575.

Gowland, R. & Western, A. 2012. Morbidity in the Marshes: Using Spatial Epidemiology to Investigate Skeletal Evidence for Malaria in Anglo-Saxon England (Ad410-1050). *American Journal of Physical Anthropology,* 147**,** 301-311.

Graesch, A. 2009. Fieldworker Experience and Single-Episode Screening As Sources of Data Recovery Bias in Archaeology: A Case Study from the Central Pacific Northwest Coast. *American Antiquity,* 74**,** 759-779.

Granger, I. and Phillpots, C., 2011 *The Cistercian Abbey of St Mary Graces, East Smithfield, London*. London: Museum of London Archaeology

Grauer, A. 1991. Life patterns of Women from Medieval York. *in:* D. Walde and N.D. Willows (Ed.) *The Archaeology of Gender*, 407-13. Calgary: Chacmool.

Greatrex, J. 2007. Cultural at Canterbury in the Fifteenth Century: Some Indications of the Cultural Environment of A Monk of Christ Church. *in:* Clark, J. G. (Ed.) *The Culture of Medieval English Monasticism.* Woodbridge: The Boydell Press.

Grudzen, G. J. 2007. *Medical Theory About the Body and the Soul in the Middle Ages: The First Western Medical Curriculum at Monte Cassino / Gerald J. Grudzen; With a Foreword By Richard W. Bulliet,* Lewiston, N.Y.; Lampeter: Edwin Mellen Press.

Guttentag, A. R. & Salwen, J. K. 1999. Keep your Eyes on the Ribs: The Spectrum of Normal Variants and Diseases That Involve the Ribs. *Scientific Exhibit,* 19**,** 1125-1142.

Haffajee, A., Teles, R., Patel, M., Song, X., Veiga, N. & Socransky, S. 2009. Factors Affecting Human Supragingival Biofilm Composition. I. Plaque Mass. *Journal of Periodontal Research,* 44**,** 511-19.

Hager, B. J. 1992. Get Thee to a Nunnery: Female Religious Claustration in Medieval Europe. *Ethology and Sociobiology,* 13**,** 385-407.

Hajat, S., Kovats, R. & Lachowycz, K. 2007. Heat-Related and Cold-Related Deaths in England and Wales: Who is at Risk? *Occupational Environmental Medicine,* 64**,** 93-100.

Hale, C. R., Scallan, E., Cronquist, A. B., Dunn, J., Smith, K., Robinson, T., Lathrop, S., Tobin-D,Äôangelo, M. & Clogher, P. 2012. Estimates of Enteric Illness Attributable to Contact with Animals and Their Environments in the United States. *Clinical Infectious Diseases,* 54**,** S472-S479.

Hammond, P. W., 1995. *Food and Feast in Medieval England,* Stroud: Alan Sutton.

Harrison, and Fauci, A. S., Braunwald, E., Kasper, D., Hauser, S. L., Longo, D. L., Jameson, J. L. & Loscalzo, J. 2008. *Harrison's Principles of Internal Medicine (17th Edition),* New York, Mcgraw-Hill Professional.

Hartley, D. 2004. Rural Health and Health Care Disparities. *American Journal of Public Health,* 94**,** 1675-1678.

Hartley, D. 1993. *Medieval Costume and Life: A Review of Their Social Aspects Arranged Under Various Classes and Workers with Instructions for Making Numerous Types of Dress* Washington; London: Batsford.

Harvey, B. 2002. *Living and Dying in England 1100-1540: The Monastic Experience,* Oxford, Oxford University Press.

Hatcher, J., Piper, A. J. & Stone, D. 2006. Monastic Mortality: Durham Priory, 1395-1529. *Economic History Review,* 59**,** 667-687.

Hawkes, E 2000. [S]he will…protect and defend her rights boldly by law and reason…': Women's Knowledge of Common Law and Equity Courts in Late-Medieval England. *in*. *Medieval Women and the Law.* Woodbridge: The Boydell Press.

Henisch, B. A. 1976. *Fast and Feast: Food in Medieval Society /,* University Park; London: Pennsylvania State University Press.

Herder, M. 2005. Substitute Or Subordinate? The Role of a Male Procurator at a Benedictine Women's Monastery. *Journal of Medieval History,* 31**,** 231-242.

Hershkovitz, I., Latimer, B., Dutour, O., Jellema, L. M., Wish-Baratz, S., Rothschild, C. & Rothschild, B. M. 1997. Why Do We Fail in Aging the Skull from the Sagittal Suture? *American Journal of Physical Anthropology,* 103**,** 393-9.

Higgins, R. L., Haines, M. R., Walsh, L. & Sirianni, J. 2002. The Poor in the Mid-Nineteenth Century. *in:* Steckel, R. H. & Rose, J. C. (Eds.) *The Backbone of History: Health and Nutrition in the Western Hemisphere* Cambridge: Cambridge University Press.

Hildegard, S., 1997. *The Book of the Rewards of Life.* Translated By Bruce W. Hozeski*,* New York: Oxford University Press.

Hildegard, S., 2001. *Selected Writings.* Translated with an Introduction and Notes By Mark Atherton*,* London: Penguin.

Hillson, S. 2005. *Teeth,* Cambridge, Cambridge University Press.

Hinton, D. A. 2005. *Gold and Gilt, Pots and Pins: Possessions and People in Medieval Britain,* Oxford: Oxford University Press.

Hippocrates 1969. *Airs, Waters, and Places. Arabic & English.,* Cambridge, Published for the Cambridge Middle East Centre By Heffer.

Hiscock, P. 2002. Quantifying the Size of Artefact Assemblages. *Journal of Archaeological Science,* 29**,** 251-258.

Hodges, L. F., 2005. *Chaucer and Clothing: Clerical and Academic Costume in the General Prologue to the Canterbury Tales.* Cambridge: D.S. Brewer.

Holst, M. 1998. Hull Magistrates Court Skeletal Pathology Forms. Bradford: University of Bradford Bioarchaeological Anthropology Research Centre.

Holst, M. 2009. Sinningthwaite Skeletal Recording Forms. York: York Osteoarchaeology Ltd.

Holt, B. M. & Formicola, V. 2008. Hunters of the Ice Age: The Biology of Upper Paleolithic People. *Yearbook of Physical Anthropology,* 51**,** 70-99.

Holt, B. M. & Formicola, V. 2008. Hunters of the Ice Age: The Biology of Upper Paleolithic People. *Yearbook of Phsysical Anthropology,* 51**,** 70-99.

Hoover, K. C. 2010. Smell with Inspiration: The Evolutionary Significance of Olfaction. *Yearbook of Physical Anthropology,* 53**,** 63-74.

Hopcroft, R. L. 1994. The Social Origins of Agrarian Change in Late Medieval England. *American Journal of Sociology,* 99**,** 1559-1595.

Howe, G. M. 1997. *People, Environment, Disease and Death: A Medical Geography of Britain throughout the Ages,* Cardiff: University of Wales Press.

Hsia, J., Rodabough, R. J., Manson, J. E., Liu, S., Freiberg, M. S., Graettinger, W., Rosal, M. C., Cochrane, B., Lloyd-Jones, D., Robinson, J. G. & Howard, B. V. 2010. Evaluation of the American Heart Association Cardiovascular Disease Prevention Guideline for Women. *Circulation: Cardiovascular Quality and Outcomes,* 3**,** 128-134.

Hudson-Edwards, K. A., Macklin, M. G., Finlayson, R. & Passmore, D. G. 1999. Mediaeval Lead Pollution in the River Ouse at York, England. *Journal of Archaeological Science,* 26**,** 809-819.

Hunt, D. R. 2011. *The Robert J Terry Anatomical Skeletal Collection* [Online]. Smithsonian National Museum of Natural History. Available: Http://Anthropology.Si.Edu/Cm/Terry.Htm [Accessed 12 December 2011].

Hunter, A. A. & Gassner, B. R. 1998. Evaluation of the Flote-Tech Machine-Assisted Flotation System. *American Antiquity,* 63**,** 143-156.

Hunter, D. J., Niu, J., Zhang, Y., Nevitt, M. C., Xu, L., Lui, L.-Y., Yu, W., Aliabadi, P., Buchanan, T. S. & Felson, D. T. 2005. Knee Height, Knee Pain, and Knee Osteoarthritis: The Beijing Osteoarthritis Study. *Arthritis & Rheumatism,* 52**,** 1418-1423.

Hyson, J. 2003. History of the Toothbrush. *Journal of Historical Dentistry,* 51**,** 73-80.

İşcan, M.Y., Loth, S.R. and Wright, R.K. 1985 Age estimation from the rib by phase analysis: white females. Journal of Forensic Sciences 30(3): 853-863.

İşcan, M. Y., Loth, S. R. & Wright, R. K. 1984. Age Estimation from the Rib By Phase Analysis: White Males. *Journal of Forensic Sciences,* 29**,** 1094-1104.

Issac, L. 1998. Hull Magistrates Court Skeletal Recording Forms. Bradford: University of Bradford Bioarchaeological Anthropology Research Centre.

Jackson, R. 2006. *Excavations at St James's Priory, Bristol,* Oxford: Oxbow Books.

Jacquart, D. & Thomasset, C. 1988. *Sexuality and Medicine in the Middle Ages,* Princeton, Princeton University Press.

James, W. P. T., Nelson, M., Ralph, A. & Leather, S. 1997. Socioeconomic Determinants of Health: The Contribution of Nutrition to Inequalities in Health. *British Medical Journal,* 314**,** 1545-1549.

Jankauskas, R. 2003. The Incidence of Diffuse Idiopathic Skeletal Hyperostosis and Social Status Correlations in Lithuanian Skeletal Materials. *International Journal of Osteoarchaeology,* 13**,** 289-293.

Jantz, L. M. 2001. Book Reviews: Developmental Juvenile Osteology. *American Journal of Physical Anthropology,* 116**,** 80-81.

Jocelin of Brakelond 1989. Chronicle of the Abbey of Bury St Edmunds. Oxford: Oxford University Press.

Jørgensen, D. 2008. Cooperative Sanitation: Managing Streets and Gutters in Late Medieval England and Scandinavia. *Technology and Culture,* 49**,** 547-567.

Jørgensen, D. 2010. Local Government Responses to Urban River Pollution in Late Medieval England. *Water History,* 2**,** 35-52.

Jurkowski, M. & Ramsay, N. 2007a. *English Monastic Estates, 1066-1540: A List of Manors, Churches and Chapels. Part One: Bedfordshire to Kent.* List and Index Society

Jurkowski, M. & Ramsay, N. 2007b. *English Monastic Estates, 1066-1540: A List of Manors, Churches and Chapels. Part Three Sussex to Yorkshire.* List and Index Society

Kalm, L. M. & Semba, R. D. 2005. They Starved So That Others Be Better Fed: Remembering Ancel Keys and the Minnesota Experiment. *Journal of Nutrition,* 135**,** 1347-1352.

Keene, D. 1982. Rubbish in Medieval Towns. *in:* Hall, A. R. & K, K. H. (Eds.) *Environmental Archaeology in the Urban Context: Cba Research Report, 43.* London: Council for British Archaeology.

Keeping, D. C. 2000. *Life and Death in England Nunneries.* PhD, University of Bradford.

Kemp, R. L. 1996. *The Church and Gilbertine Priory of St Andrew, Fishergate,* York: Published for the York Archaeological Trust By the Council for British Archaeology.

Kempis, Thomas A. ND. *Imitatio Christi. English,* London: Nelson.

Kerr, J. 2009. *Life in The Medieval Cloister* London; New York: Continuum.

Keys, A. B. 1950. *The Biology of Human Starvation,* Minneapolis, University of Minnesota.

Kinane, D. F. 2001. Causation and Pathogenesis of Periodontal Disease. *Periodontology 2000,* 25**,** 8-20.

Kinlen, L. J. 1982. Meat and Fat Consumption and Cancer Mortality: A Study of Strict Religious Orders in Britain. *The Lancet,* 24**,** 946-9.

Kiss, C., Szilagyi, M., Paksy, A. & Poor, G. 2002. Risk Factors for Diffuse Idiopathic Skeletal Hyperostosis: A Case-Control Study. *Rheumatology,* 41**,** 27-30.

Klemperer, W. D. & Boothroyd, N. 2004. *Excavations at Hulton Abbey, Staffordshire 1987-1994,* Leeds, Maney Publishing.

Knowles, D. 1976 *Bare Ruined Choirs: The Dissolution of the English Monasteries.* Cambridge, Cambridge University Press.

Knowles, D. 1948. *The Religious Orders in England: The Old Orders 1216-1340.The Friars 1216-1340. The Monasteries and Their World,* Cambridge, Cambridge University Press.

Knowles, D. 1955. *The Religious Orders in England: The End of the Middle Ages,* Cambridge, Cambridge University Press.

Knowles, D. 1959. *The Religious Orders in England: The Tudor Age,* Cambridge, Cambridge University Press.

Knowles, D. 1976. *The Monastic Order in England: A History of Its Development from the Times of St. Dunstan to the Fourth Lateran Council, 940-1216,* Cambridge, Cambridge University Press.

Krieger, N. 2003. Genders, Sexes, and Health: What Are the Connections--and Why Does It Matter? *International Journal of Epidemiology,* 32**,** 652-657.

Lambert, M. 2002. *Medieval Heresy: Popular Movements from the Gregorian Reform to the Reformation,* Oxford: Blackwell.

Langdon, J. 1993. Inland water transport in medieval England. *Journal of Historical Geography,* 19**,** 1-11.

Langdon, J. 1982. The Economics of Horses and Oxen in Medieval England. *The Agricultural History Review,* 30**,** 31-40.

Langland, W., 2008. *Piers Plowman: A New Annotated Edition of the C-Text;* [Ed.] Derek Pearsall*,* Exeter: University of Exeter Press.

Larsen, C. S. 1983. Behavioural Implications of Temporal Change in Cariogenesis. *Journal of Archaeological Science,* 10**,** 1-8.

Larsen, C. S. 1997. *Bioarchaeology: Interpreting Behavior from the Human Skeleton,* Cambridge, Cambridge University Press.

Larsen, C., Crosby, A., Griffin, M., Hutchinson, D., Ruff, C., Russell, K., Schoeniger, M., Sering, L., Simpson, S., Takacs, J. & Teaford, M. 2002. A Biohistory of Health and Behavior in the Georgia Bight: The Agricultural Transition and the Impact of European Contact. *in:* Steckel, R. H. & Rose, J. C. (Eds.) *The Backbone of History: Health and Nutrition in the Western Hemisphere.* Cambridge: Cambridge University Press.

Lawrence, C. H. 1989. *Medieval Monasticism: Forms of Religious Life in Western Europe in the Middle Ages,* London, Longman.

Leclercq, J., 1974. *The Love of Learning and the Desire for God. 2nd Rev Ed.* New York: Fordham University Press.

Levine, M.E., Suarez, J.A., Brandhorst, S., Balasubramanian, P. Cheng, C-W. Madia, F., Fontana, L., Mirisola, M.G., Guevara-Aguirre, J., Wan, J., Passarino, G., Kennedy, B.K., Wei, M., Cohen, P., Crimmins, E.M., Longo, V.D. 2014. Low Protein Intake is Associated with a Major Reduction in IGF-1, Cancer, and Overall Mortality in the 65 and Younger but Not Older Population *Cell Metabolism*. 19(3). 407-417

Lewis, M. E. 2002. Impact of Industrialization: Comparative Study of Child Health in Four Sites from Medieval and Postmedieval England (A.D. 850-1859). *American Journal of Physical Anthropology,* 119**,** 211-223.

Lewis, M. E., Roberts, C. A. & Manchester, K. 1995. Comparative Study of the Prevalence of Maxillary Sinusitis in Later Medieval Urban and Rural Populations in Northern England. *American Journal of Physical Anthropology,* 98**,** 497-506.

Lieverse, A. R. 1999. Diet and the Aetiology of Dental Calculus. *International Journal of Osteoarchaeology,* 9**,** 219-32.

Lindsay, D. 1989. *Ane Satyre of the Thrie Estaitis,* Edinburgh: Canongate.

Loe, L. 1988. St James' Priory Skeletal Recording Forms. Bristol.

Lovejoy, C. O., Meindl, R. S., Pryzbeck, T. R. & Mensforth, R. P. 1985. Chronological Metamorphosis of the Auricular Surface of the Ilium: A New Method for the Determination of Adult Skeletal Age at Death. *American Journal of Physical Anthropology,* 68**,** 15-28.

Lovell, N. C. 1989. Test of Phenice's Technique for Determining Sex from the Os Pubis. *American Journal of Physical Anthropology,* 79**,** 117-120.

Lukacs, J. R. & Largaespada, L. L. 2006. Explaining Sex Differences in Dental Caries Prevalence: Saliva, Hormones, and "Life-History" Etiologies. *American Journal of Human Biology,* 18**,** 540-555.

Mackenbach, J. P., Kunst, A. E., De Vrij, J. H. & Van Meel, D. 1993. Self-Reported Morbidity and Disability Among Trappist and Benedictine Monks. *American Journal of Epidemiology,* 138**,** 569-573.

Macphail, R. I., Galinié, H. & Verhaeghe, F. 2003. A Future for Dark Earth?. *Antiquity.* 77, 296. 349-358.

Makowski, E. M. 1999. *Canon Law and Cloistered Women: Periculoso and Its Commentators, 1298-1545,* Washington, The Catholic University of America Press.

Malde, M. K., Scheidegger, R., Julshamn, K. & Bader, H.P. 2011. Substance Flow Analysis: a Case Study of Fluoride Exposure through Food and Beverages in Young Children Living in Ethiopia. *Environmental Health Perspectives,* 119**,** 579-584.

Maltby, M. 2006. Integrating Zooarchaeology: Introduction. *in:* Maltby, M. (Ed.) *Integrating Zooarchaeology: Proceedings of the 9th Conference of the International Council of Zooarchaeology.* Oxford: Oxbow Books.

Mann, M. E., Zhang, Z., Rutherford, S., Bradley, R. S., Hughes, M. K., Shindell, D., Ammann, C., Faluvegi, G. & Ni, F. 2009. Global Signatures and Dynamical Origins of the Little Ice Age and Medieval Climate Anomaly. *Science,* 326**,** 1256-1260.

Masalin, K. & Murtomaa 1992. Work-Related Behavioral and Dental Risk Factors Among Confectionery Workers. *Scandinavian Journal of Work, Environmental & Health,* 16**,** 388-392.

Mays, S. 2012. The Relationship Between Paleopathology and the Clinical Sciences. *in:* Grauer, A. L. (Ed.) *A Companion to Paleopathology.* Chichester: Wiley-Blackwell.

Mays, S. 2010. Human Osteoarchaeology in the UK 2001-2007: A Bibliometric Perspective. *International Journal of Osteoarchaeology,* 20**,** 192-204.

Mays, S. 2007. The Human Remains. *in:* Mays, S., Harding, C. & Heighway, C. (Eds.) *Wharram; A Study of Settlement on the Yorkshire Wolds, XI: The Churchyard.* York: York University Archaeological Publications.

Mays, S. 2006. The Osteology of Monasticism in Medieval England. *in:* Gowland, R. & Knüsel, C. J. (Eds.) *Social Archaeology of Funerary Remains.* Oxford: Oxford Books.

Mays, S. 1997. A Perspective on Human Osteoarchaeology in Britain. *International Journal of Osteoarchaeology,* 7**,** 600-604.

McGillivray, M. & Noorbakhsh 2004. Composite Indices of Human Well-Being *in:* World Institute for Development Economics Research

McKern, T. W. & Stewart, T. 1957. Skeletal Age Changes in Young American Males Analysed from the Standpoint of Age Identification. Natick, Mass.: Quartermaster Research & Development Center, Environmental Protection Research Division.

Mclynn, N. B. 1994. *Ambrose of Milan: Church and Court in a Christian Capital,* Berkeley, University of California Press.

McNamara, J. A. K. 1996. *Sisters in Arms,* Cambridge, Harvard University Press.

Meindl, R. S. & Lovejoy, C. O. 1985. Ectocranial Suture Closure: A Revised Method for the Determination of Skeletal Age at Death Based on the Lateral-Anterior Sutures. *American Journal of Physical Anthropology,* 68**,** 57-66.

Meindl, R. S., Lovejoy, C. O., Mensforth, R. P. & Walker, R. A. 1985. A Revised Method of Age Determination Using the Os Pubis, with a Review and Tests of Accuracy of Other Current Methods of Pubic Symphyseal Aging. *American Journal of Physical Anthropology,* 68**,** 29-45.

Merbs, C. F. 1989. Trauma. *in:* Iscan, M. Y. & Kennedy, K. A. R. (Eds.) *Reconstruction of Life from the Skeleton.* New York: Wiley-Liss, Inc.

Merrett, D. C. & Pfeiffer, S. 2000. Maxillary Sinusitis As an Indicator of Respiratory Health in Past Populations. *American Journal of Physical Anthropology,* 111**,** 301-318.

Mertens, M. T. & Gertner, E. 2011. Rheumatic Manifestations of Scurvy: A Report of Three Recent Cases in a Major Urban Center and a Review. *Seminars in Arthritis and Rheumatism,* 41**,** 286-290.

Metoffice. 2012. *Regional Values - Winter* [Online]. Available: Http://www.Metoffice.Gov.UK/Climate/UK/2012/Winter/Averages.Html [Accessed 15 June 2012].

Metzger, B. M. & Coogan, M. D. 1993. *The Oxford Companion to the Bible,* Oxford, Oxford University Press.

Miles, A. E. W. 1963. The Dentition in the Assessment of Individual Age in Skeletal Material. *in:* Brothwell, D. (Ed.) *Dental Anthropology.* Oxford: Pergamon Press.

Miller, E., Ragsdale, B. D. & Ortner, D. J. 1996. Accuracy in Dry Bone Diagnosis: A Comment on Paleopathological Methods. *International Journal of Osteoarchaeology,* 6**,** 221-229.

Misra, M., Aggarwal, A., Miller, K. K., Almazan, C., Worley, M., Soyka, L. A., Herzog, D. B. & Klibanski, A. 2004. Effects of Anorexia Nervosa on Clinical, Hematological, Biochemical, and Bone Density Parameters in Community-Dwelling Adolescent Girls. *Pediatrics,* 114.

Mitchell, P. D. 2011. Retrospective Diagnosis and the Use of Historical Texts for Investigating Disease in the Past. *International Journal of Paleopathology,* 1**,** 81-88.

Mitchell, J. E. 1986. Anorexia Nervosa: Medical and Physiological Aspects. *in:* Brownell, K. D. & Foreyt, J. P. (Eds.) *Handbook of Eating Disorders: Physiology, Psychology, and Treatment of Obesity, Anorexia, and Bulimia.* New York: Basic Books

Moffet, L. 2006. The Archaeology of Medieval Plant Foods. *in:* Woolgar, C., Serjeantson, D. & Waldron, T. (Eds.) *Food in Medieval England: Diet and Nutrition.* Oxford: Oxford University Press.

Molleson, T. I. 1986. Skeletal Age and Palaeodemography. *in:* Bittles, A. H. & Collins, K. J. (Eds.) *The Biology of Human Ageing.* Cambridge: Cambridge University Press.

Moorhouse, S. and Wrathmell, S. 1987. *Kirkstall Abbey: Volume 1; The 1950-64 Excavations: A Reassessment.* Wakefield: West Yorkshire Archaeological Service.

Mowbray, D. 2001. *Pain and Suffering in Medieval Theology: Academic Debates at the University of Paris in the Thirteenth Century,* Woodbridge: Boydell.

Mundee, MM. 2010. *Exploring Diet and Society in Medieval Spain: New Approaches Using Stable Isotope Analysis.* PhD Thesis. Durham University

Murray, J. 2008. One Flesh, Two Sexes, Three Genders? *in:* Bitel, L. M. & Lifshitz, F. (Eds.) *Gender & Christianity in Medieval Europe: New Perspectives.* Philadelphia: University of Pennsylvania Press.

National Institute for Health and Clinical Excellence (Nice), 2010. *Quality Standards* [Online]. Available: Http://www.Nice.Org.UK/Aboutnice/Qualitystandards/ [Accessed 7 October 2010].

Natoli, R. & Zuhair, S. 2010. Measuring Progress: A Comparison of the GDP, HDI, GS and the RIE. *Social Indicators Research***,** 1-24.

Newson, R., Strachan, D., Archibald, E., Emberlin, J., Hardarker, P. & Collier, C. 1998. Acute Asthma Epidemics, Weather and Pollen in England, 1987-1994. *European Respiratory Journal,* 11**,** 694-701.

Newton, D. 2007. Borders and Bishopric: Regional Identities in the Pre-Modern North East, 1559-1620. *in:* Green, A. & Pollard, A. J. (Eds.) *Regions and Regionalism in History: Regional Identities in North-East England, 1300-2000.* Woodbridge: The Boydell Press.

Nord, A., Mattsson, E. & Tronner, K. 2005. Factors Influencing the Long-Term Corrosion of Bronze Artefacts in Soil. *Protection of Metals,* 41**,** 309-316.

Norton, S., Connell, B. & Boylston, A. 1998. The Human Skeletal Remains. *in:* Evans, D. (Ed.) *The Post-Excavation Assessment and Updated Project Design for the Hull Magistrates Courts Site.* Hull.

O'Conner, Terry. 1991. Bones from 46-54 Fishergate. London: Published for York Archaeological Trust by the Council for British Archaeology.

Office for National Statistics (ONS) 2012. *Release Plans for 2011 Census Statistics* [Online]. Available: Http://www.Ons.Gov.UK/Ons/Guide-Method/Census/2011/Census-Data/2011-Census-Prospectus/Release-Plans-for-2011-Census-Statistics/Index.Html [Accessed 16 July 2012].

Origen 1936. *On First Principles (De Principiis),* London, SPCK Publishing.

Ortner, D. 1998. Male-Female Immune Reactivity and Its Implications for Interpreting Evidence in Human Skeletal Paleopathology. *in:* Grauer, A. L. & Stuart-Macadam, P. (Eds.) *Sex and Gender in Paleopathological Perspective.* Cambridge: Cambridge University Press.

Ortner, D. J. & Ericksen, M. F. 1997. Bone Changes in the Human Skull Probably Resulting from Scurvy in Infancy and Childhood. *International Journal of Osteoarchaeology,* 7**,** 212-220.

Ortner, D. J., Butler, W., Cafarella, J. & Milligan, L. 2001. Evidence of Probable Scurvy in Subadults from Archeological Sites in North America. *American Journal of Physical Anthropology,* 114**,** 343-351.

Orton, C. 2000. *Sampling in Archaeology,* Cambridge: Cambridge University Press.

Pálfi Gy, Ardagna Y, Molnár E, Dutour O, Panuel M, Haas CJ, Zink A, Nerlich AG 1999. Coexistence of Tuberculosis and Ankylosing Spondylitis in a 7-8th Century Specimen Evidenced By Molecular Biology. in GY Pálfi, O Dutour, J Deák, I Hutás (Eds), *Tuberculosis Past and Present*, Golden Book Publisher, Budapest, P. 403-409.

Panhuysen, R. G., Coenen, V. & Bruintjes, T. D. 1997. Chronic Maxillary Sinusitis in Medieval Maastricht, the Netherlands. *International Journal of Osteoarchaeology,* 7**,** 610-614.

Paris, M. 1982. *Chronica Majora. English,* Gloucester: Alan Sutton.

Paterson, L. M. 1995. *The World of the Troubadours: Medieval Occitan Society, C.1100-C1300,* Cambridge, Cambridge University Press.

Patrick, P. J. 2004. *"Greed, Gluttony and Intemperance"? Testing the Stereotype of the 'Obese Medieval Monk'.* PhD, University College London.

Pechenkina, E. & Delgado, M. 2006. Dimensions of Health and Social Structure in the Early Intermediate Period Cemetery at Villa El Salvador, Peru. *American Journal of Physical Anthropology,* 131**,** 218-235.

Peltier, L. F. 1990. *Fractures: A History and Iconography of Their Treatment,* San Francisco, Norman Publishing.

Perry, M. A. 2007. Is Bioarchaeology a Handmaiden to History? Developing a Historical Bioarchaeology. *Journal of Anthropological Archaeology,* 26**,** 486-515.

Pestell, R. 1987. Medieval Art and the Performance of Medieval Music. *Early Music,* 15**,** 56-68.

Peters, C. 2003. *Patterns of Piety: Women, Gender and Religion in Late Medieval and Reformation England,* Cambridge, Cambridge University Press.

Peters, G. 2000. Urban Minstrels in Late Medieval Southern France: Opportunities, Status and Professional Relationships. *Early Music History,* 19**,** 201-235.

Phenice, T. W. 1969. A Newly Developed Visual Method of Sexing the Os Pubis. *American Journal of Physical Anthropology,* 30**,** 297-302.

Pinheiro, J., Cunha, E., Cordeiro, C. & Nuno Vieira, D. 2004. Bridging the Gap Between Forensic Anthropology and Osteoarchaeology Case of Vascular Pathology. *International Journal of Osteoarchaeology,* 14**,** 137-144.

Plato 1957a. Meno. *Words.* Indianapolis: Hackett Publishing Company, Inc.

Plato. 1957b. *Plato and the Christians: Passages from the Writings of Plato.* Translated with an Introduction By Adam Fox*,* London: SCM.

Plato. 1997. Phaedo. *Works.* Indianapolis, Ind.:: Hackett Pub.

Platt, C. 1978. *Medieval England: A Social History and Archaeology from the Conquest to A.D. 1600,* London, Routledge.

Playfair, J. H. L. and G Bancroft 2004. *Infection and Immunity* Oxford: Oxford University Press.

Plomp, K. A., Roberts, C. A. & Vidarsdottir, U. S. 2012. Vertebral Morphology Influences the Development of Schmorl's Nodes in the Lower Thoracic Vertebrae. *American Journal of Physical Anthropology,* 149**,** 572-582.

Polet, C. & Katzenberg, M. 2003. Reconstruction of the Diet in a Mediaeval Monastic Community from the Coast of Belgium. *Journal of Archaeological Science,* 30**,** 525-533.

Porphyry, C. C. 1999. *On Abstinence from Killing Animals:* Translated By G. Clark*,* London: Duckworth.

Pottie, P., Presle, N., Terlain, B., Netter, P., Mainard, D. & Berenbaum, F. 2006. Obesity and Osteoarthritis: More Complex Than Predicted! *Annals of Rheumatic Diseases,* 65**,** 1403-1405.

Power, E. E. 1922. *Medieval English Nunneries C. 1275 to 1535,* Cambridge: Cambridge University Press.

Press, A. R. 1971. *Anthology of Troubadour Lyric Poetry,* Edinburgh, Edinburgh University Press.

Rapley, M. 2003. *Quality of Life Research: A Critical Introduction,* London, Sage.

Rastall, R. 1970. Minstrelsy, Church and Clergy in Medieval England. *Proceedings of the Royal Musical Association,* 97**,** 83-98.

Rawcliffe, C. 1997. *Medicine and Society in Later Medieval England,* Phoenix Mill, Sutton Publishing.

Rawcliffe, C. 1998. Hospital Nurses and Their Work. *in:* Britnell, R. (Ed.) *Daily Life in the Late Middle Ages.* Thrupp: Sutton Publishing.

Raworth, K. & Stewart, D. 2004. Critiques of the Human Development Index: A Review. *in:* Fukuda-Parr, S. & Kumar, A. S. (Eds.) *Readings in Human Development: Concepts, Measures and Policies for a Development Paradigm.* OUP India.

Record Commission, R., Caley, J. & Hunter, J. 1894. *Valor Ecclesiasticus Tempore Henrici VIII (Ecclesiastical Valuation of the Reign of Henry VIII),* London, Record Commission.

Reitz, E. J. & Shackley, M. 2012. *Environmental Archaeology,* New York, Springer.

Resnick, D. & Niwayama, G. 1988. *Diagnosis of Bone and Joint Disorders,* Philadelphia, W.B. Saunders Company.

Rewekant, A. 2001. Do Environmental Disturbances of an Individual's Growth and Development Influence the Later Bone Involution Processes? A Study of Two Mediaeval Populations. *International Journal of Osteoarchaeology,* 11**,** 433-443.

Robb, J., Bigazzi, R., Lazzarini, L., Scarsini, C. & Sonego, F. 2001. Social "Status" and Biological "Status": A Comparison of Grave Goods and Skeletal Indicators from Pontecagnano. *American Journal of Physical Anthropology,* 115**,** 213-222.

Roberts, C. A. & Manchester, K. 2005. *The Archaeology of Disease,* Ithaca, Cornell University Press.

Roberts, C. A. 2007. A Bioarchaeological Study of Maxillary Sinusitis. *American Journal of Physical Anthropology,* 133**,** 792-807.

Roberts, C. A. 2009. *Human Remains in Archaeology: A Handbook,* York, Council for British Archaeology.

Roberts, C. A., Cox, M. 2003. *Health & Disease in Britain: From Prehistory to the Present Day /* Stroud: Sutton.

Roberts, C.A., M.E. Lewis and K. Manchester 2002. *Proceedings of the 3rd International Congress on the Evolution and Palaeoepidemiology of the Infectious Diseases. The Past and Present of Leprosy.* British Archaeological Reports. International Series 1054. Oxford, Archaeopress, Pp. 213-222

Rogers, J. & Waldron, T. 2001. Dish and the Monastic Way of Life. *International Journal of Osteoarchaeology,* 11**,** 357-365.

Rogers, J. 1995. *A Field Guide to Joint Disease in Archaeology,* Chichester: Wiley.

Rogers, N. S. H. 1993. *Anglian and Other Finds from 46-54 Fishergate,* London: Council for British Archaeology.

Room, R., Babor, T., and Rehm, J. 2005. Alcohol and Public Health. *The Lancet* 365 (9458) 519-530

Ross, J. M. & Zutter, C. 2007. Comparing Norse Animal Husbandry Practices: Paleoethnobotanical Analyses from Iceland and Greenland. *Arctic Anthropology,* 44**.**

Rothschild, B. M. & Woods, R. J. 1992. Erosive Arthritis and Spondyloarthropathy in Old World Primates. *American Journal of Physical Anthropology,* 88**,** 389-400.

Rothschild, B. M. & Woods, R. J. 1992. Erosive Arthritis and Spondyloarthropathy in Old World Primates. *American Journal of Physical Anthropology,* 88**,** 389-400.

Ruff, C., Scott, W. & Liu, A. Y. C. 1991. Articular and Diaphyseal Remodeling of the Proximal Femur with Changes in Body Mass in Adults. *American Journal of Physical Anthropology,* 86**,** 397-413.

Rugg-Gunn, A. 2001. Preventing the Preventable - The Enigma of Dental Caries. *British Dental Journal,* 191**,** 478-88.

Russell, K. F., Simpson, S. W., Genovese, J., Kinkel, M. D., Meindl, R. S. & Lovejoy, C. O. 1993. Independent Test of the Fourth Rib Aging Technique. *American Journal of Physical Anthropology,* 92**,** 53-62.

Sabine, E. 1937. City Cleaning in Mediaeval London. *Speculum*. 12, 19-43

(SACN) Scientific Advisory Committee on Nutrition. 2011. Dietary Reference Values for Energy. The Stationary Office Ltd.

Salter, R. B. 1999. *Textbook of Disorders and Injuries of the Musculoskeletal System: An Introduction to Orthopaedics, Fractures, and Joint Injuries, Rheumatology, Metabolic Bone Disease, and Rehabilitation,* Baltimore; London: Williams & Wilkins.

Saul, N. 1997. Medieval England: Identity, Politics, and Society. *in:* Saul, N. (Ed.) *The Oxford Illustrated History of Medieval England.* Oxford: Oxford University Press.

Scheuer, L. & Black, S. M. 2000. *Developmental Juvenile Osteology,* London, Elsevier Academic Press.

Schiffer, M. B. 1983. Toward the Identification of Formation Processes. *American Antiquity,* 48**,** 675-706.

Schucksmith, M., Cameron, S., Merridew, T. & Pichler, F. 2009. Urban-Rural Differences in Quality of Life Across the European Union. *Regional Studies,* 43**,** 1275-1289.

Schultz, J. A. 2006. *Courtly Love, The Love of Courtliness, and the History of Sexuality,* Chicago, The University of Chicago Press.

Seedhom, B. B. 2006. Conditioning of Cartilage During Normal Activities is an Important Factor in the Development of Osteoarthritis. *Rheumatology,* 45**,** 146-149.

Serjeantson, D. 2006. Birds: Food and a Mark of Status. *in:* Woolgar, C., Serjeantson, D. & Waldron, T. (Eds.) *Food in Medieval England: Diet and Nutrition.* Oxford: Oxford University Press.

Shahar, S. 2003. *The Fourth Estate: A History of Women in the Middle Ages,* London New York, N.Y.: Routledge.

Sibbison, J. 1990. More About Fluoride. *The Lancet,* 336**,** 737.

Slavin, R. F., Spector, S. L. & Bernstein, I. L. 2005. The Diagnosis and Management of Sinusitis: A Practice Parameter Update. *Journal of Allergy Clinical Immunology,* 116**,** S13-S47.

Sledzik, P. S. & Sandberg, L. G. 2002. The Effects of 19th Century Military Service on Health. *in:* Steckel, R. H. & Rose, J. C. (Eds.) *The Backbone of History: Health and Nutrition in the Western Hemisphere.* Cambridge: Cambridge University Press.

Sloane, B. 2012 *The Augustinian Nunnery of St. Mary Clerkenwell, London: Excavations 1974-96*. London: Museum of London Archaeology.

Snape, R. H. 1926. *English Monastic Finances in the Later Middle Ages,* Oxford: Oxford University Press

Sokoloff, L. 1969. *The Biology of Degenerative Joint Disease,* Chicago, The University of Chicago Press.

Spencer, B. 1998. *Pilgrim Souvenirs and Secular Badges,* London: Stationery office.

Spencer, R. K. 2008. *Testing Hypotheses About Diffuse Idiopathic Skeletal Hyperostosis (Dish) Using Stable Isotope and aDNA Analysis of Late Medieval British Populations.* PhD, Durham University.

Sreebny, L. M. (1983), Cereal Availability and Dental Caries. Community Dentistry and Oral Epidemiology, 11: 148–155.

Standen, V. G., Arriaza, B. T. & Santoro, C. M. 1997. External Auditory Exostosis in Prehistoric Chilean Populations: A Test of the Cold Water Hypothesis. *American Journal of Physical Anthropology,* 103**,** 119-129.

Standring, S., Borley, N., Collins, P., Crossman, A. R., Gatzoulis, M. A., Healy, J. C., Johnson, D., Mahadevan, V., Newell, R. L. & Wigley, C. B. 2005. *Gray's Anatomy: The Anatomical Basis of Clinical Practice,* Edinburgh, New York, Elsevier Churchill Livingstone.

Steckel, R. H., Larsen, C. S., Sciulli, P. W. & Walker, P. L. 2002. *A History of Health in Europe over the Past 10,000 Years: Summary of a Research Proposal [Online]*. Available: Http://Global.Sbs.Ohio-State.Edu/Project_Overview.Htm [Accessed 8 September 2010].

Steckel, R. H., Sciulli, P. W. & Rose, J. C. 2002. A Health Index from Skeletal Remains. *in:* Steckel, R. H. & Rose, J. C. (Eds.) *The Backbone of History.* Cambridge: Cambridge University Press.

Stirland, A. ND Elstow Skeletal Recording Sheets. Bedford.

Streicher, L. H. 1967. On a Theory of Political Caricature. *Comparative Studies in Society and History,* 9**,** 427-445.

Stroud, G. 1986. St Andrew Priory Skeletal Recording Sheets. York: York Archaeological Trust.

Stroud, G. and Kemp R.L. 1993. *Cemeteries of the Church and Priory of St. Andrew, Fishergatep,* York: Published for the York Archaeological Trust by the Council for British Archaeology.

Swanson, R. N. 2007. *Indulgences in Late Medieval England: Passports to Paradise?,* Cambridge; New York: Cambridge University Press.

Synnott, A. 1997. *The Body Social: Symbolism, Self and Society,* London: Routledge.

Szalai, A. 1980. *The Quality of Life* London: Sage.

Tafuri, M. A., Bentley, R. A., Manzi, G. & Lernia, S. D. 2006. Mobility and Kinship in the Prehistoric Sahara: Strontium Isotope Analysis of Holocene Human Skeletons from the Acacus Mts. (Southwestern Libya). *Journal of Anthropological Archaeology,* 25**,** 390-402.

Tallyn, A. 2007 *The Artefacts of Urban and Rural Medieval Monasteries in Yorkshire.* MA Thesis, University of York

Taylor, G. M., Tucker, K, Butler, R, Pike, AWG, Lewis, J, Roffey, S, Marter, P, Lee, OY-C, Wu, HHT, Minnikin, DE, Besra, GS, Singh, P, Cole, ST, Stewart, GR. 2013. Detection and Strain Typing of Ancient *Mycobacterium leprae* from a Medieval Leprosy Hospital. *PLOS ONE*, 8, 4.

Tertullian, C. C. 1985. *De Exhortatione Castitatis. French & Latin,* Paris: Cerf.

Thomas, R. 2006. Of Books and Bones: the Integration of Historical and Zooarchaeological Evidence in the Study of Medieval Animal Husbandry. *in:* Maltby, M. (Ed.) *Integrating Zooarchaeology: Proceedings of the 9th Conference of the International Council of Archaeozoology.* Oxford: Oxbow Books.

Thompson, S. 1991. *Women Religious: The Founding of English Nunneries after the Norman Conquest,* Oxford, Clarendon Publishers.

Timio, M., Saronio, P., Venanzi, S., Gentili, S., Verdura, C. & Timio, F. 1999. Blood Pressure in Nuns in a Secluded Order: A 30-Year Follow-Up. *Mineral and Electrolyte Metabolism,* 25.

Timms, S. & Mike Griffiths and Associates, L. 2006. Syningthwaite Priory: Outline Mitigation Statement. York.

Todd, T. W. & Lyon Jr., D. W. 1924. Endocranial Suture Closure: Its Progress and Age Relationship. *American Journal of Physical Anthropology,* 7**,** 325-384.

Todd, T. W. 1921. Age Changes in the Pubic Bone. *American Journal of Physical Anthropology,* 4**,** 1-77.

Tosi, L. L., Boyan, B. D. & Boskey, A. 2005. Does Sex Matter in Musculoskeletal Health. *Journal of Bone and Joint Surgery,* 87a**,** 1631-1648.

Trevisa, J. 1869. *Polychronicon Ranulph Higden Monachi Cestrensis. English Translations of John of Trevisa,* London, Longmans, Green & Co.

Turner, B. S. 1996. *The Body and Society: Explorations in Social Theory,* London: Sage.

Tyson, R. C. 1996. *Medieval Glass Vessels in England Ad 1200-1500: A Survey.* PhD, University of Durham.

Ubelaker, DH 1989 *Human Skeletal Remains: Excavation, Analysis, Interpretation* 2nd Ed Smithsonian Manuals on Archaeology 2 Taraxacum Press: Washington, DC

Ullrich, H. 1975. Estimation of Fertility By Means of Pregnancy and Childbirth Alterations at the Pubis, the Ilium, and the Sacrum. *Ossa,* 2, 23-39.

United Nations Development Programme (UNDP) 2010. Human Development Reports 2010: The Real Wealth of Nations: Pathways to Human Development. New York: United Nations Development Programme

United Nations Development Programme (UNDP), 2008. Human Development Report 2007/2008: Fighting Climate Change: Human Solidarity in a Divided World. New York: United Nations Development Programme.

United Nations Development Programme (UNDP) 1990. Human Development Report 1990. New York: United Nations Development Programme.

Van Der Velden, U., Abbas, F., Armand, S., Loos, B., Timmerman, M., Van Der Weijden, G., Van Winkelhoff, A. & Winkel, E. 2006. Java Project on Periodontal Diseases. The Natural Development of Periodontitis: Risk Factors, Risk Predictors and Risk Determinants. *Journal of Clinical Periodontology,* 33(8)**,** 540-548.

Van Haaster, H. 1994. Plant Resources and Environment in Late Medieval Lübeck. *in:* Hall, A. R. & Kenward, H. K. (Eds.) *Urban-Rural Connexions: Perspectives from Environmental Archaeology: Symposia of the Association for Environmental Archaeology No. 12.* Oxford: Oxbow Books.

Van Zanden, J. L. 2005. What Happened to the Standard of Living Before the Industrial Revolution? New Evidence from the Western Part of the Netherlands. *in:* Allen, R. C., Bengentsson, T. & Dribe, M. (Eds.) *Living Standards in the Past: New Perspectives on Well-Being in Asia and Europe.* Oxford: Oxford University Press.

VCH & Page, W. 1904. *Houses of Benedictine Nuns: The Abbey of Elstow* [Online]. Available: Http://www.British-History.Ac.UK/Report.Aspx?Compid=40034 [Accessed 24 November 2009].

VCH & Page, W. 1907a. *Houses of Benedictine Monks: The Abbey of Tewkesbury* [Online]. Available: Http://www.British-History.Ac.UK/Report.Aspx?Compid=40269 [Accessed 29 May 2012].

VCH & Page, W. 1907b. *Houses of Benedictine Monks: The Priory of St James, Bristol* [Online]. Available: Http://www.British-History.Ac.UK/Report.Aspx?Compid=40272 [Accessed 24 November 2009].

VCH & Page, W. 1909. *Hospitals: Hospitals of the Savoy* [Online]. Available: Http://www.British-History.Ac.UK/Report.Aspx?Compid=35379 [Accessed 25 January 2012].

VCH & Page, W. 1973. *Houses of Benedictine Nuns: Nunnaminster (Abbey of St Mary, Winchester)* [Online]. Available: Http://www.British-History.Ac.UK/Report.Aspx?Compid=38096 [Accessed 24 November 2009].

VCH & Page, W. 1974. *Gilbertine Houses: Priory of St Andrew, York* [Online]. Available: Http://www.British-History.Ac.UK/Report.Aspx?Compid=36280 [Accessed 24 November 2009].

VCH, Greenslade, M. W. & Pugh, R. B. 1970. *Houses of Cistercian Monks: The Abbey of Hulton* [Online]. Available: Http://www.British-History.Ac.UK/Report.Aspx?Compid=37849 [Accessed 9 May 2012].

Vercellotti, G., Stout, S. D., Boano, R. & Sciulli, P. W. 2011. Intrapopulation Variation in Stature and Body Proportions: Social Status and Sex Differences in an Italian Medieval Population (Trino Vercellese, Vc). *American Journal of Physical Anthropology,* 145**,** 203-214.

Vickers, N. 1995. The Social Class of Yorkshire Medieval Nuns. *Yorkshire Archaeological Journal,* 67**,** 127-132.

Waldron, T. 2009. *Palaeopathology,* Cambridge, Cambridge University Press.

Waldron, T. 1985. Dish at Merton Priory: Evidence for a "New" Occupational Disease? *British Medical Journal,* 291**,** 1762-3.

Waldron, T. 1994. *Counting the Dead: The Epidemiology of Skeletal Populations,* Chichester, John Wiley & Sons.

Walker, P. L., Bathurst, R. R., Richman, R., Gjerdrum, T. & Andrushko, V. A. 2009. The Causes of Porotic Hyperostosis and Cribra Obitalia: A Reappraisal of the Iron-Deficiency-Anemia Hypothesis. *American Journal of Physical Anthropology,* 139**,** 109-125.

Ward, C. V., Mays, S., Child, S. & Latimer, B. 2010. Lumbar Vertebral Morphology and Isthmic Spondylolysis in a British Medieval Population. *American Journal of Physical Anthropology,* 141**,** 273-280.

Watts, A. & Addy, M. 2001. Tooth Discolouration and Staining: A Review of the Literature. *British Dental Journal,* 190**,** 309-316.

Waugh, A. & Grant, A. 2006. *Ross and Wilson Anatomy and Physiology in Health and Illness,* Edinburgh, Church Livingstone Elsevier.

Weinstein, D. & Bell, R. M. 1982. *Saints and Society: The Two Worlds of Western Christendom, 1000-1700,* Chicago, University of Chicago Press.

Wiess, E. & Jurmain, R. D. 2007. Osteoarthritis Revisited: A Contemporary Review of Aetiology. *International Journal of Osteoarchaeology,* 17**,** 437-450.

Wilhelm, J. J. 1990. *Lyrics of the Middle Ages: an anthology* New York: Garland.

Wilson, C. 2002. Cheesecakes, Junkets, and Syllbubs. *Gastronomica: The Journal of Food and Culture,* 2**,** 19-23.

Winchester Museums Service 1993. *Nunnaminster: A Saxon and Medieval Community of Nuns,* Winchester, Winchester Museums Service

Wood, J. W., Milner, G. R., Harpending, H. C. & Weiss, K. M. 1992. The Osteological Paradox: Problems of Inferring Prehistoric Health from Skeletal Samples. *Current Anthropology,* 33**,** 343-370.

Woolgar, C. 2001. Fast and Feast: Conspicuous Consumption and the Diet of the Nobility in the Fifteenth Century. *in:* Hicks, M. (Ed.) *Revolution and Consumption in Late Medieval England.* Woodbridge: The Boydell Press.

Workshop of European Anthropologists (WEA) 1980. Recommendations for Age and Sex Diagnoses of Skeletons. *Journal of Human Evolution,* 9**,** 517-549.

World Health Organisation (Who), 2010. World Health Statistics 2010. Geneva: World Health Organization.

Wright, L. E. & Yoder, C. J. 2003. Recent Progress in Bioarchaeology: Approaches to the Osteological Paradox. *Journal of Archaeological Research,* 11**,** 43-70.

Wycliffe, J., D. . 1992. *On Simony,* New York, Fordham University Press.

Yoder, C. J. 2010. Diet in Medieval Denmark: A Regional and Temporal Comparison. *Journal of Archaeological Science,* 37**,** 2224-2236.

Ziegler, J. 2001. Religion and Medicine in the Middle Ages. *in:* Billing, P. & Ziegler, J. (Eds.) *Religion and Medicine in the Middle Ages; York Studies in Medieval Theology III.* York: York Medieval Press.

Zuckerman, M. K. & Armelagos, G. J. 2010. The Origins of Biocultural Dimensions in Bioarchaeology. *in:* Agarwal, S. C. & Glencross, B. A. (Eds.) *Social Bioarchaeology.* Chichester: Wiley -Blackwell.